HYSTERANGIUM IN NORTH AMERICA[1]

SANFORD M. ZELLER

Plant Pathologist, Oregon Agricultural College and Experiment Station
Formerly Visiting Fellow in the Henry Shaw School of Botany of Washington University

AND CARROLL W. DODGE

Curator of the Farlow Herbarium, Harvard University
Formerly Rufus J. Lackland Fellow in the Henry Shaw School of Botany of Washington University

HYSTERANGIUM

Hysterangium Vittadini, Monogr. Tuberac. 13–15. 1831; Tulasne, Fung. Hypog. 80–85. 1851; Winter in Rabenhorst, Krypt.-Fl. Deutschl. ed. 2, I. **1:** 878–879. 1883; DeToni in Sacc. Syll. Fung. **7:** 155–158. 1888; Hesse, Hypog. Deutschl. **1:** 94–105. 1891; Harkness, Cal. Acad. Sci. Proc. III. **1:** 254–257. 1899; E. Fischer in Engl. & Prantl, Die Nat. Pflanzenfam. I. **1****: 306. 1899; Bucholtz, Материалы къ морфологіи и систематикѣ подземныхъ грибовъ (Tuberaceae И Gastromycetes pr. p.) съ приложеніемъ описанія видовъ, найденныхъ до сихъ поръ въ предѣлахъ Россіи. Издан. Естеств. Ист. Музея Графини Е. П. Шереметевой въ с. Михайловскомъ Московской Губ. **1:** 151–153. 1902 [sometimes cited as Beitr. Morph. Syst. Hypog.]; Th. M. Fries, Svensk Bot. Tidskr. **3:** 279–281. 1909; Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 26–27. 1912; Soehner, Pilz und Krauterfreund **5:** 254–256. 1922.

Hyperrhiza Endlicher, Gen. Pl. 28. 1836 (in part).

Splanchnomyces Corda, Icones Fung. **6:** 37–45. 1854 (in part).

The type species of the genus is considered to be *Hysterangium clathroides* Vittadini in accordance with the recommendations of the Committee on Nomenclature of the Botanical Society of America, Bot. Soc. Am. Publ. 73: 70–71. 1919, since the author states that he has collected this species many times and describes it at greater length.

[1] The authors hereby express their thanks to the American Association for the Advancement of Science for a grant to the senior author. This grant materially aided in the work presented in this paper and in other manuscripts to be published later.

Issued March 13, 1929.

Fructifications spherical, ellipsoidal, oblately spheroidal to reniform and irregular; fibrils filiform, terete or flattened, loose to innately appressed, simple or anastomosing, usually less prominent than in *Rhizopogon*, leading to rhizomorphs, usually dark-colored; peridium simple or duplex, of fibrous, parenchymatous or pseudoparenchymatous context, usually separable, indehiscent; gleba lacunose, usually tough, gelatinous-cartilaginous, penetrated from the basal attachment by a simple or dendroid columella of fibrous or pseudoparenchymatous tissue; septa fibrous or pseudoparenchymatous, often radiating from columella; basidia 1–several-spored; spores smooth (sometimes with loose epispore), typically fusiform to elongate-ellipsoidal, sometimes ovoidal, greenish, brownish or white in mass.

Hysterangium is so familiar to mycologists, and its relationships have been so fully treated by one of us[1] that its characteristics need not be discussed here. In 1831 Vittadini included in the genus hypogaeous Gasteromycetes having smooth spores and peridia which dissolve or split off at maturity. Since then the genus has been emended to include species with semi-persistent or indehiscent peridia, but its limits are characteristic and for the most part unmistakable. Cunningham's[2] genus, *Phallobata*, is closely related to *Hysterangium* through *Hysterangium Phillipsii* Harkness.

This paper describes 31 species and lists 2 doubtful and 3 excluded species. Sixteen are European, 19 North American, 4 South American, 2 African, and 7 from Australia or near-by islands. Within the United States the species are found principally along the Pacific Coast where in California and Oregon alone 15 species are reported. Three species have been found in New England, two in New York, three in Tennessee, two in North Carolina, and one each in Ohio and Wyoming.

There are 5 named varieties described. Among the 31 species, there is one newly named, 11 are here first described in Latin, of which 7 are described as new by the writers, and one new combination is proposed.

[1] Dodge, C. W. Gasteromycetes in Gäumann & Dodge, Comparative morphology of Fungi, p. 492 et seq. New York, 1928.

[2] Cunningham, G. H. A new genus of the Hysterangiaceae. New Zealand Inst. Trans. **56**: 71–73. 1926.

We have followed the plan, adopted in previous taxonomic papers, of giving the data and location of specimens cited. Unless otherwise stated, colors have been compared with Ridgway's 'Color Standards and Color Nomenclature,' Washington, D. C., 1912.

We gratefully acknowledge those who have made this work possible by putting at our disposal personal collections or the facilities of libraries and herbaria. We are indebted to the Missouri Botanical Garden for the use of its library and herbarium; to Leland Stanford Jr. University for access to the Dudley Herbarium, and to Dr. LeRoy Abrams and Professor J. McMurphy for assistance in the study of Harkness' specimens there; to Dr. P. Claussen of Marburg University for a loan of Hesse's material; to Dr. J. B. Cleland for Australian collections; to Dr. G. H. Cunningham for New Zealand material; to Harvard University for access to collections at the Farlow Herbarium, and to Dr. R. Thaxter for putting at our disposal many of his own collections, and for helpful suggestions; to the late Mr. C. G. Lloyd for the courtesies of the Lloyd Museum; to Mr. H. E. Parks for many of his collections and notes on freshly collected material; to Mr. L. Rodway for Tasmanian collections; to Drs. W. A. Setchell and N. L. Gardner for access to the herbarium of the University of California; and to Dr. Ert Soehner for authentic material of *H. Rickeni*.

Key to the Species of Hysterangium

1. Peridium wholly or in part parenchymatous or pseudoparenchymatous 2
1. Peridium without parenchyma or pseudoparenchyma.....16
   2. Gleba purplish brown (dry).....*H. purpureum* (p. 110)
   2. Gleba brownish, yellowish or ochraceous (dry).....3
   2. Gleba greenish (dry).....7
3. Peridium in one layer of pseudoparenchyma.....4
3. Peridium in more or less distinct layers.....5
   4. Peridium membranous, 400 μ or more thick.....
      .....*H. stoloniferum* and variety (p. 111, 112)
   4. Peridium compact, 120–320 μ thick.....*H. neocaledonicum* (p. 113)
   4. Peridium of larger, softer-walled cells, 90–110 μ thick....*H. album* (p. 87)
5. Both layers of peridium pseudoparenchymatous.....*H. neglectum* (p. 88)
5. One layer of the peridium filamentous and one layer parenchymatous.....6
   6. Peridium 350–640 μ thick; fructifications large, 3–6 cm. in diameter; septa about 200 μ thick.....*H. occidentale* (p. 89)
   6. Peridium 240–320 μ thick; fructifications less than 2 cm. in diameter; septa 50–80 μ thick.....*H. strobilus* (p. 90)

7. Peridium of a single layer....8
7. Peridium of more than one layer....13
8. Spores mostly 5 μ or less in length....*H. Phillipsii* (p. 91)
8. Spores 7 μ or more in length....9
9. Septa more than 70 μ thick....10
9. Septa less than 60 μ thick....12
10. Peridium separated from gleba by a definite filamentous layer....11
10. Peridium not separated from the gleba by a definite filamentous layer; septa 70–150 μ thick; peridium 120–240 μ thick.... *H. affine* and varieties (p. 92, 93)
11. Septa less than 175 μ thick; peridium 220–450 μ thick...*H. clathroides* (p. 93)
11. Septa more than 220 μ thick; peridium 100–200 μ thick.... *H. clathroides* var. *crassum* (p. 96)
12. Septa 12–30 μ thick; spores 7–10 μ long; peridium 320–375 μ thick....*H. obtusum* (p. 97)
12. Septa 45–60 μ thick; spores 12–17 μ long; peridium 65–160 μ thick.... *H. inflatum* (p. 98)
13. Peridium more than 200 μ thick....14
13. Peridium less than 200 μ thick....15
13. Peridium 100–240 μ thick, outer layer cottony-filamentous, inner pseudoparenchymatous; spores 13–18 μ long....*H. nephriticum* (p. 99)
14. Outer peridial layer definitely parenchymatous, 80–200 μ thick, inner layer pseudoparenchymatous; spores 8–12μ long..*H. coriaceum* (p. 113)
14. Both peridial layers parenchymatous, outer layer about 25 μ thick; spores 13–22 μ long....*H. crassirhachis* (p. 101)
15. Outer peridial layer pseudoparenchymatous, inner filamentous.... *H. siculum* (p. 114)
15. Outer peridial layer filamentous, inner pseudoparenchymatous.... *H. Harknessii* (p. 102)
16. Peridium of more than one layer....17
16. Peridium of one layer....18
17. Spores less than 6 μ long; peridium more than 1500 μ thick.... *H. Thaxteri* (p. 114)
17. Spores more than 10 μ long; peridium less than 500 μ thick.... *H. cinereum* (p. 103)
18. Peridium less than 60 μ thick....19
18. Peridium more than 70 μ thick....20
19. Septa 10–15 μ thick; spores 7.5–11 $\times$ 5–6 μ....*H. membranaceum* (p. 104)
19. Septa 25–60 μ thick; spores 14–15 $\times$ 4–5 μ....*H. pumilum* (p. 115)
20. Gleba buff, brownish, yellowish or ochraceous....21
20. Gleba greenish....24
21. Spores less than 17 μ long; peridium mostly more than 180 μ thick....22
21. Spores 17–21 $\times$ 6–8 μ; peridium 160–180 μ thick; fructifications drying wood-brown....*H. Thwaitesii* (p. 116)
22. Spores 12 μ or more long and broadly fusiform....23
22. Spores 12 μ or less long and narrowly fusiform; fructifications drying buckthorn-brown to mummy-brown....*H. fuscum* (p. 105)
23. Fructifications drying ochraceous buff to russet; spores light buff in mass; gleba drying fragile....*H. rubricatum* (p. 105)

23. Fructifications drying buffy olive to light brownish olive; spores olivaceous in mass; gleba drying hard.....*H. Pompholyx* (p. 106)
24. Peridium less than 300 μ thick.....25
24. Peridium more than 400 μ thick.....26
25. Spores fusiform, 10–17 $\times$ 6–7.5 μ; septa 50–120 μ thick..*H. cistophilum* (p. 107)
25. Spores fusiform, sometimes papillate, 15–18 $\times$ 6–7 μ.....*H. Rickeni* (p. 117)
25. Spores ellipsoid, 8–11 $\times$ 4–5.5 μ; septa 35–80 μ thick.....*H. Fischeri* (p. 109)
26. Spores more than 17 μ long; peridium more than 1000 μ thick.....
.....*H. fragile* (p. 118)
26. Spores less than 15 μ long; peridium less than 700 μ thick.....27
27. Peridium 600 μ thick, of alternate layers of light and dark brown hyphae.
.....*H. calcareum* (p. 119)
27. Peridium 500 μ thick, homogeneous, yellow-spotted.....*H. Petri* (p. 119)

1. **Hysterangium album** Zeller & Dodge, sp. nov.

Pl. 1, fig. 1; pl. 3, fig. 5.

Fructificationes globosae vel depressae, ad 7 mm. diametro metientes, "cartridge-buff" (Ridgway); columella dendroidea, tenuis; peridium separabile, 90–110 μ crassitudine, pseudoparenchymate hyalino, hyphis superficialibus, crystallis oxalatis incrustatis; gleba "cartridge-buff" (Ridgway) vel obscuratior; locelli magni, vacui, globosi vel irregulares; septa hyalina, 50–150 μ crassitudine, hyphis compacte contextis; basidia clavata vel ovata, ad 13 $\times$ 7–8 μ, bispora, rarius tetraspora, sterigmatibus brevibus; sporae hyalinae vel cremeae acervatae, fusiformes, papillatae, appendiculatae, 13–21.5 $\times$ 5–7 μ.

Type: in Fitzpatrick Herb., in Dodge Herb., and in Zeller Herb.

Fructifications spherical or somewhat depressed-globose, up to 7 mm. in diameter, cartridge-buff when dry; columella dendroid, small; peridium separable, 90–110 μ thick, pseudoparenchymatous, with superficial hyphae which are encrusted with oxalate crystals; gleba cartridge-buff or darker, consisting of a few large cavities in older specimens; cavities empty, rounded to irregular; septa hyaline, 50–150 μ, composed of compactly interwoven hyphae; basidia small, hyaline, clavate to ovate, 13 $\times$ 7–8 μ, usually 2-spored, rarely 4-spored; sterigmata short; spores hyaline, cream-colored in mass, smooth, broadly fusiform, usually with a papillate apex and base with short appendage, 13–21.5 $\times$ 5–7 μ.

This species seems to have close affinities with *H. neocaledonicum* Patouillard, but it differs in general color, size, and texture, and in the thickness of the peridium which is of a looser texture than in *H. neocaledonicum*.

Specimens examined:

New York: Ithaca, *H. M. Fitzpatrick, 364*, type (in Fitzpatrick Herb., Dodge Herb., and in Zeller Herb. 2800).

2. Hysterangium neglectum Massee & Rodway, Kew Bull. Misc. Inf. **1899:** 181. 1899; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 247. 1902; Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 27. 1912; **1923:** 156. 1924. Pl. 3, figs. 2, 7.

Type: probably in Kew Herb. and in Rodway Herb.; cotype in Dodge Herb. and Zeller Herb.

Fructifications 1–1.5 cm. in diameter, drying to less than 1 cm., rugulose, white when fresh, drying clay color to Saccardo's umber; mycelium not seen; columella large, penetrating to the middle of the fructification, much-branched, branches penetrating to peridium; fibrils prominent, waxy, concolorous or darker; peridium 160–250 μ, not separable, duplex, the outer layer up to 80 μ, very variable in thickness, deep brown under the microscope, pseudoparenchyma of narrow, thick-walled cells; the inner layer 80–170 μ, composed of hyaline, thin-walled pseudoparenchyma, most of whose cells are periclinal; gleba subgelatinous, drying Prout's brown to bister, cavities elongate, 160–200 μ in diameter, nearly filled with spores at maturity; septa hyaline, 30–40 μ between hymenia, composed of very slender hyphae with gelatinized walls; basidia 7 × 9 μ, hyaline, oblong-pyriform with four slender sterigmata 4–5 μ long; spores smooth, broadly ellipsoid to ovoid, 14–18 × 7–8 μ, brownish, epispore thick, spores more or less stuck together by the gelatinization of walls, usually long-pedicellate.

Under *Quercus*. Oregon and Tasmania. October.

Because of the shape and color of the spores this species has about as close affinities with *Hymenogaster* as *H. inflatum* has with *Dendrogaster*.

Specimens examined:

Oregon: Linn Co., *S. M. Zeller* (in Oregon Agr. Coll. Herb. 4866, and Zeller Herb. 2583).

Tasmania: Hobart, *L. Rodway 614*, cotype (ex Massee Herb. in N. Y. Bot. Gard. Herb.); *1118* (in Lloyd Mus.); *1263*, *1266* (in Dodge Herb. 337, 349, in Zeller Herb. 7224, 7225).

3. Hysterangium occidentale Harkness, Cal. Acad. Sci. Proc. III. **1**: 255. 1899; Saccardo & P. Sydow in Sacc. Syll. Fung. **16**: 245. 1902. Pl. 3, figs. 1, 9.

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ.

Fructifications spherical to somewhat depressed, 3 × 6 × 6 cm., of firm consistency from abundant rhizomorphic growth in soil, dirty white to pallid mouse-gray, darkening to drab or hair-brown in alcohol, fibrils few, concolorous, conspicuous, free to adnate; base not prominent; columella penetrating at least to the middle of the fructification, branched, with a cartilaginous appearance when fresh; peridium duplex, separable, 350–640 μ thick; outer layer often flaking off, 85–300 μ thick, dark brown, composed of brown hyphae in rhizomorph-like periclinal strands, loosely interwoven, clamp-connections frequent; inner layer parenchymatous, 260–400 μ thick, parenchyma not compact, characterized by long hypha-like cells, as in illustration (pl. 3, fig. 1); gleba light pink when fresh (Parks), becoming buckthorn-brown to raw umber in alcohol or when dry; cavities empty, radiating from columella; septa 200 μ thick, composed of closely woven, gelatinized hyaline hyphae; basidia linear, filiform, collapsing, 2–4-spored; sterigmata short, stout; spores yellow-brown in mass, ellipsoidal, cell wall thickened at apex, 12–16 × 5–7 μ.

Under *Quercus*. Oregon and California. Spring and early summer.

Mature plants are nearly odorless or have the pleasant odor of some species of *Polyporus*. Fruiting bodies are tough and rubbery when fresh. It is a large coarse species.

Specimens examined:

Oregon: Benton County, Corvallis, *S. M. Zeller, 7063* (in Oregon Agr. Coll. Herb. 4868, and Zeller Herb. 7063).

California: Marin County, Mt. Tamalpais, *H. W. Harkness, 242*, cotype (in Dudley Herb. at Leland Stanford Jr. Univ.); Santa Clara County, Alma, *H. E. Parks, Z26* (in Zeller Herb. 1712, and Univ. Cal. Herb. 468); Morgan Hill, *C. W. Dodge & M. S. Clemens* (in Dodge Herb. 1533 and 1534).

4. Hysterangium strobilus Zeller & Dodge, sp. nov.

Pl. 1, fig. 6; pl. 3, fig. 11.

Fructificationes subsolitariae, globosae, 1–1.5 cm. diametro metientes, siccatae minus quam 1 cm., argillaceae servatae, subalbidae siccatae; columella magna, arborea, velut strobili *Pini Strobi*, percurrens, basis rhizomorphis confecta, funiculis alteris destitutis; peridium 240–320 μ crassitudine, tenuibus hyphis 2–3 μ diametro dense compactum, hyphis exteris superficiei perpendicularibus, intus 65–120 μ, parenchymate hyalina; gleba elastica, cacaotica brunnea recens, olivacea siccata; locelli irregulares, sporis subimpleti; septa subscissilia, 50–80 μ crassitudine, magnis hyalinis hyphis gelatinosis; basidia cylindrica (an collapsa?) bi- vel tetra-spora, 12–16 × 3–6 μ; sterigmata 5–12 × 2–2.5 μ; sporae 12–16.5 × 5–6.3 μ, subfusiformes.

In fagetis, Tennessee.

Type: in Thaxter Herb.

Fructifications subsolitary, globose, 1–1.5 cm. in diameter, drying less than 1 cm., clay color in alcohol, nearly white when dry; columella large, dendroid, resembling the cones of *Pinus Strobus* when seen in section, percurrent; base of rhizomorphs but no other fibrils; peridium duplex, 240–320 μ thick, outer layer 120–250 μ, composed of slender, loosely woven hyphae 2–3 μ in diameter, with some hyphae often running perpendicular to the surface, somewhat in strands, inner layer 65–120 μ, of hyaline parenchyma, easily separable from gleba; outer layer separable from inner layer of peridium; gleba rubbery in consistency, chocolate-brown when fresh, drying olive; cavities irregular, partially filled with spores; septa somewhat scissile, 50–80 μ thick, composed of large hyaline hyphae with gelatinous walls; basidia cylindrical (or collapsed?) 2–4-spored, 12–16 × 3–6 μ; sterigmata stout, 5–12 × 2–2.5 μ; spores 12–16.5 × 5–6.3 μ, brown, subfusiform, with heavy exospore, which is rather loosely sheathing in dry specimens.

Under *Fagus*. Tennessee.

This species is most closely related to *H. occidentale* Harkn. in structure of peridium and color and texture of gleba, but it is smaller in the dimensions of all of the sterile tissues. *H. occidentale* is a larger, coarser species. *H. strobilus* is similar to *H. Harknessii* in peridial characters but differs in color and texture of the gleba.

Specimens examined:

Tennessee: Burbank, *R. Thaxter*, *B4H*, type (in Thaxter Herb.).

5. Hysterangium Phillipsii Harkness, Cal. Acad. Sci. Proc. III. **1:** 255. 1899; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 216. 1902. Pl. 3, fig. 26.

Illustrations: Harkness, Cal. Acad. Sci. Proc. III. **1:** *pl. 42, f. 1.*

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ. Fructifications 3–6 cm. in diameter, ellipsoid to pyriform in shape, rose-pink (Harkness), Mars brown to warm sepia in alcohol, fibrils none; base rhizoidal-branching, very long; columella penetrating to middle of fructification, branching; peridium about 275 μ thick, of thin-walled cells which are olivaceous brown, 3–4 μ, forming a collapsed pseudoparenchyma? underlaid with a thick layer (about 400 μ) of white sterile gelatinous glebal tissue; gleba deep olive to jade-green; septa 40 μ between hymenia, hyaline; basidia, 2–2.5 × 7–9 μ, cylindric, 2-spored; sterigmata filiform, 3–4 μ; spores oblong, appendiculate, hyaline to olivaceous, 3–5 × 1–1.5 μ.

In coniferous and hard wood forests. Ohio and Pacific Coast. Spring and summer.

This species is more nearly a radicate or stipitate species than any of this genus. The basal portion, however, is a contraction of the peridium which leads to a dense mass of mycelium of white or pale pink strands. The surface of the fruiting bodies is subnitid-glabrous with small shallow pits lighter in tint than the surrounding surface. The Ohio collection was taken from the surface of a very rotten, continually wet log, where the fructifications were entirely superficial.

Cunningham's new genus, *Phallobata*,[1] surely has its closest relationship to the genus *Hysterangium*, through *H. Phillipsii*. *Phallobata* is found on decaying wood, as was the large collection of Ohio material of *H. Phillipsii*. Both are distinctly radicate and have similar spores.

Specimens examined:

Ohio: Herrouns Woods, Maumee Valley near Toledo, *W. R. Lowater, No. ORAN* (in Dodge Herb. 2847, Oregon Agr. Coll. Herb. 4869, and Zeller Herb. 7227).

[1] Cunningham, G. H. A new genus of the Hysterangiaceae. New Zealand Inst. Trans. **56:** 71–73. 1926.

Oregon: Corvallis, *W. H. Dreesen* (in Zeller Herb. 1849, and Dodge Herb. 356).

California: Placer County, Wire Bridge, *C. L. Phillips* (H. W. Harkness, 234, cotype, in Dudley Herb. at Leland Stanford Jr. Univ.).

6. Hysterangium affine Massee & Rodway, Kew Bull. Misc. Inf. **1898:** 127. 1898; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 246. 1902; Rodway, Roy Soc. Tasmania Papers & Proc. **1911:** 27. 1912; **1923:** 154–155. 1924. Pl. 2, fig. 1; pl. 3, fig. 6.

Type: in Kew Herb. and in Rodway Herb. but not seen.

Fructifications 1–2 cm. in diameter, white at first, drying pinkish buff to avellaneous; mycelium white, terete, branched; fibrils scarce, black, innate, small, only on the under side of the fructification; columella dendroid; peridium easily separable, 120–240 μ thick, composed of parenchyma of large, thin-walled cells, the outer layer of sterile glebal tissue 200–220 μ thick, composed of thick-walled, hyaline, highly gelatinized hyphae 3–4 μ in diameter, often so regular as to make the peridium appear duplex; gleba "toughly gelatinous, dark greenish slate" (Rodway), the freshly cut gleba deep slate-olive to dull greenish black (1), but the fractured surface, after drying, is gnaphalium-green to sage-green, very hard; cavities irregular, small, filled with spores; septa 70–150 μ thick, composed of highly gelatinized hyphae 5–7 μ in diameter; basidia clavate, 4–6-spored, 16–18 × 6 μ; sterigmata short; spores hyaline, ellipsoidal, 8–15 × 3–5.5 μ (average 9.7 ± 0.4 μ).

Under *Quercus* and *Eucalyptus*. Oregon and Tasmania. June to October.

Specimens examined:

Oregon: Linn County, *S. M. Zeller, 2585* (in Oregon Agr. Coll. Herb. 4855, and Zeller Herb.).

California: Alameda County, Shepard Canon, near Oakland, *H. E. Parks, 1168, 1169* and *C. W. Dodge* (in Univ. Cal. Herb., Zeller Herb., and Dodge Herb. 1582, 1580).

Tasmania: Hobart, Cascades, *L. Rodway, 1122*, and unnumbered specimen (in Lloyd Mus. 1122 and 086); Proctor's Road, *L. Rodway, 1261* (in Dodge Herb. 308, and Zeller Herb. 7064).

Australia: South Australia, Mt. Lofty, *J. B. Cleland*, *8* (in Cleland Herb., Dodge Herb. 2848, and Zeller Herb.).

6a. Var. **irregulare** Massee, Kew Bull. Misc. Inf. **1901:** 158. 1901; Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 27. 1912.

Hysterangium Eucalyptorum Lloyd, Myc. Notes **65:** 1031. 1921; **66:** 1119–1120. 1922.

Illustrations: Lloyd, Myc. Notes **66:** *f. 2132*.

Type: probably in Kew Herb. and Rodway Herb. but not seen.

This variety was distinguished by its irregular outlines, by its thinner peridium, darker gleba, and smaller spores, but the extreme variations in size of the spores of a single fructification are greater than those given for this variety.

On roots of *Eucalyptus*. Ecuador and Tasmania.

Specimens examined:

Ecuador: Quito, *L. Mille*, *3*, type of *H. Eucalyptorum* (in Lloyd Mus.).

6b. Var. **tenuispora** Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 27. 1912.

Type: probably in Rodway Herb. but not seen.

This variety was distinguished from the type by the thinner peridium, nearly black gleba, and slender spores 12–14 × 2.5–3 μ in length, being more than four times the width instead of less than three times as in the species.

7. Hysterangium clathroides Vittadini, Monogr. Tuberac. 13–14. 1831; Corda, Anleit. z. Stud. Myc. 110. 1842; Icones Fung. **5:** 26. 1842; Tulasne, Fung. Hypog. 80–82. 1851; DeToni in Sacc. Syll. Fung. **7:** 155–156. 1888; Hesse, Fung. Hypog. **1:** 98–100. 1891; Harkness, Cal. Acad. Sci. Proc. III. **1:** 256. 1899; Bucholtz, Материалы къ морфологіи и систематикѣ подземныхъ грибовъ . . . Издан. Естеств. Ист. Музея Графини Е. П. Шереметевой въ С. Михайловскомъ Московской губ. **1:** 152–153. 1902 [often cited as Beitr. Morph. Syst. Hypog.]; Th. M. Fries, Svensk Bot. Tidskr. **3:** 280. 1909; Rodway, Roy.

Soc. Tasmania Papers & Proc. **1911:** 27. 1912; 1923; 155–156. 1924; Th. C. E. Fries, Arkiv f. Bot. **17**[9]**:** 18. 1921. Pl. 2, fig. 3; pl. 3, fig. 12.

Splanchnomyces clathroides Corda (ed. Zobel), Icones Fung. **6:** 41. 1854.

Hysterangium stoloniferum var. *americanum* Fitzpatrick, Ann. Myc. **11:** 129–135. 1913.

Rhizopogon virens Fries, Syst. Myc. **2:** 294. 1823 (excl. syn. sec. spec. in Herb. Fries, fide Th. M. Fries, Svensk Bot. Tidskr. **3:** 280. 1909); Karsten, Finska Vet.-Soc. Bidrag Natur och Folk **25:** 354–355. 1876 [Myc. Fenn. **3:** 354–355. 1876]; *Ibid.* **48:** 18–19. 1889 [Krit. Ofversigt af Finl. Basidsv. 18–19. 1889]. —*Rhizopogon virescens* Karsten in Sacc. Syll. Fung. **9:** 280. 1891 (sec. spec. in Herb. Karsten, fide Th. M. Fries, Svensk Bot. Tidskr. **3:** 280. 1909).

Illustrations: Vittadini, Monogr. Tuberac. *pl. 4, f. 2;* Corda, Anleit. z. Stud. Myc. *pl. D, f. 46*[1–4]*;* Icones Fung. **6:** *pl. 8, f. 77;* Hesse, Hypog. Deutschl. **1:** *pl. 1, f. 10–14; pl. 7, f. 19;* E. Fischer, in Engl. & Prantl, Die Nat. Pflanzenfam. I. **1:** 305. *f. 154;* Gillet, Champ. Fr. Gast. **3:** *pl. 28;* Bucholtz, *l. c. pl. 1, f. 16;* Fitzpatrick, Ann. Myc. **11:** *f. 2, 6, 10, 20–28.*

Type: location unknown to us.

Fructifications globose, becoming very irregular on drying, white to pale ochraceous buff or light ochraceous salmon when fresh, becoming buff-pink to onion-skin pink where bruised, drying ochraceous tawny to Prout's brown; fibrils variable from terete and free to innate or appressed; columella usually large and prominent, often branching near the base; peridium 220–450 μ thick, parenchymatous, the cells varying from 12 to 40 μ in diameter (see pl. 2, fig. 3); gleba green when fresh, becoming citrine drab or grayish olive to dark greenish olive on drying; cavities polyhedral to irregular, with a tendency to radiate from the columella, small, empty; septa 85–140 μ thick, composed of large, thin-walled, loosely woven hyphae up to 5–7 μ in diameter, finally becoming highly gelatinized; basidia long, irregularly cylindrical, 3–4-spored (mostly 3-spored); sterigmata usually short, although sometimes becoming 16–18 μ long; spores acrogenous, olivaceous in mass, lanceolate, 12–19 × 6–8 μ (averaging

15.3 ± 0.9 μ long), with a thick epispore which sometimes is slightly roughened and becomes loosened in age, sometimes papillate at apex, sometimes not.

Under oaks and other deciduous trees. Cosmopolitan.

This species has a white peridium which turns brown or rusty on exposure to the air. The more or less brittle peridium is easily separable. The gleba is tough and gristly when fresh. The plants are usually found scattered or densely crowded in rocky soil or in soil-filled pockets on rocky ledges. The taste of young plants is pleasant, but the odor of mature ones is so offensive that tasting would be difficult. Hollós, who studied an authentic specimen from Vittadini communicated by Mattirolo, states that the spores are 14–18 × 6–7 μ.

Specimens examined:

Exsiccati: L. Fuckel, Fungi Rhenani Suppl. 2616; Transhel & Serebrianikov, Mycoth. Ross. 216.

Russia: Moscow, Mikhailovskoe, *F. Bucholtz* in Transhel & Serebrianikov, Mycoth. Ross. 216 (in Farlow Herb.).

Czechoslovakia: Cechy, Vloi dul ad Tabor, *F. Bubak* (in von Hoehnel Herb. at Farlow Herb. and in Lloyd Mus. 05861).

Austria: Wiener Wald, *F. von Hoehnel* (in von Hoehnel Herb. at Farlow Herb.); also specimen of *G. Bresadola* det. *H. Thwaitesii* without locality (in Patouillard Herb. at Farlow Herb.).

Germany: Altmorschen, *R. Hesse* (in Farlow Herb.).

Maine: Kittery, Gerrish Island, *R. Thaxter* (in Thaxter Herb.).

Vermont: Rutland County, Pawlet, *C. W. Dodge* (in Dodge Herb.).

New York: Ithaca, Coy Glen, *F. M. Blodgett* (in N. Y. State Coll. Agr. Cornell Univ. Plant Path. Herb. 5342, in Zeller Herb., Lloyd Mus., and Dodge Herb.); *H. H. Whetzel* (in N. Y. State Coll. Agr. Cornell Univ. Plant Path. Herb. 8269, Zeller Herb., and Dodge Herb.); *H. M. Fitzpatrick,* type of *Hysterangium stoloniferum* Tul. var. *americanum* Fitzp. (in N. Y. State Coll. Agr. Cornell Univ. Plant Path. Herb. 8448, Zeller Herb., and Dodge Herb.).

Wyoming: Medicine Bow National Forest, *C. H. Kauffman & B. B. Kanouse* (in Univ. Mich. Crypt. Herb., and in Zeller Herb. 7049).

Oregon: Corvallis, *L. M. Boozer, 35, 36* (in Oregon Agr. Coll. Herb. 4871, 4872, Zeller Herb. 2209, 2801, and Dodge Herb. 320, 321); *S. M. Zeller, 2074, 2582, 7191* (in Zeller Herb., Oregon Agr. Coll. Herb. 4857, 4858, and Dodge Herb.).

California: Placer County, Auburn, *H. W. Harkness, 140* (in Dudley Herb. at Leland Stanford Jr. Univ.); Marin County, Mill Valley, *H. W. Harkness, 119* (in Dudley Herb. at Leland Stanford Jr. Univ.); San Rafael, *H. E. Parks, 2043, 2096, 2111* (in Univ. Cal. Herb. and Zeller Herb.); Santa Clara County, Aldercroft Creek, *H. E. Parks, 60* (in Dodge Herb. 311, and Zeller Herb. 7196), *Z327* (in Zeller Herb. 1662); Saratoga, *H. E. Parks, 452, 971, 978, 992, 995, Z21* (in Univ. Cal. Herb., Zeller Herb. 1664, 7207, 7208, 7210, 7211, 1686, and Dodge Herb. 315, 313, 314, 316, 317); Guadaloupe, *H. E. Parks, 315, 326, 347, 363, 382, 383, 869, Z16* (in Univ. Cal. Herb., Zeller Herb. 1652, 7205, 1718, 7209, 7206, 1674, 7202, 1699, and Dodge Herb. 324, 322, 323, 325, 326, 1508); Alma, *H. E. Parks, 78, 406, 491* (in Univ. Cal. Herb., Zeller Herb. 1657, 7212, 7204, and Dodge Herb. 328, 330); Call of the Wild, *H. E. Parks, 943c* (in Univ. Cal. Herb., Zeller Herb. 7213, and Dodge Herb. 327); Santa Cruz County, Felton, *H. E. Parks, 505* (in Univ. Cal. Herb., Zeller Herb. 7214, and Dodge Herb. 329); Brookdale, *H. E. Parks, 2163* (in Univ. Cal. Herb.).

Chile: Magellanes, Punta Arenas, *R. Thaxter* (in Thaxter Herb.).

7a. Var. **crassum** Tulasne, Fung. Hypog. 81–82. 1851.

Hysterangium clathroides Fuckel, Jahrb. Nassau Ver. f. Naturk. **27:** 11. 1873 [Symb. Myc. Nachtr. **2:** 11. 1873]; Winter in Rabenhorst, Krypt.-Fl. Deutschl. ed. 2, I. **1:** 879. 1883; ? Coker & Couch, Gast. E. U. S. & Can., 17–18. 1928, non Vitt.—*Not* Fuckel, Jahrb. Nassau. Ver. f. Naturk. **23:** 38. 1869 [Symb. Myc. 38. 1869].

Type: a portion ex herb. Tulasne in Patouillard Herb. at Farlow Herb.

The variety is distinguished by its larger size, thin, white, smooth peridium, easily separable even in young specimens, covered with a loose, cottony mycelium; gleba glaucous-virescent,

becoming greenish ashy and even clay-color; septa very much thicker than in the type, dark green to almost black. The odor is very pungent, becoming fetid at maturity.

Specimens examined:

Exsiccati: L. Fuckel, Fungi Rhenani Suppl. 2509.

Germany: Altmorschen, *R. Hesse* (in Farlow Herb.).

Switzerland: Chur, *L. Fuckel*, in Fungi Rhenani Suppl. 2509 (in Farlow Herb.).

France: Paris, Parc de Maisons, *L. R. Tulasne*, type (in Patouillard Herb. at Farlow Herb.).

Maine: Kittery, *R. Thaxter, 1902a* (in Thaxter Herb.).

Oregon: Corvallis, *S. M. Zeller, 2581, 7058* (in Oregon Agr. Coll. Herb. 4859, 4864, and Zeller Herb.).

California: *H. E. Parks, 561, 1131* (in Univ. Cal. Herb., Zeller Herb. 7216, and Dodge Herb. 333); Santa Clara County, Guadaloupe, *H. E. Parks, 949, 998* (in Univ. Cal. Herb., Zeller Herb. 7215, 7217, and Dodge Herb. 1502, 2849); Alma, *H. E. Parks, Z28* (in Univ. Cal. Herb., Zeller Herb. 1709, and Dodge Herb. 332); Aldercroft Creek, *H. E. Parks, 38, 1154*, and *Dodge, 1523* (in Zeller Herb. 1658, 2718, and Dodge Herb.); Eva, *H. E. Parks, C. W. Dodge & S. M. Zeller* (in Zeller Herb. 2118, and Dodge Herb. 2850).

8. Hysterangium obtusum Rodway, n. sp. Pl. 3, figs. 3, 10.

Hysterangium obtusum Rodway, Roy. Soc. Tasmania Papers & Proc. **1919:** 112. 1920; **1923:** 156. 1924 (English description only).

Type: in Rodway Herb., cotype in Dodge Herb. and Zeller Herb.

Fructificationes sphaeroideae, irregulares, 2 cm. diametro metientes, siccatae 1.5 cm. minusve, "pale pink-violet" (Rodway) recens lectae, "light pinkish cinnamon to Sayal brown" (Ridgway) siccatae; mycelium non visum; columella fruticosa; funiculi non visi; peridium crassum 320–375 μ, hyphis tenuibus dense compactum, hyphis exteris brunneo-violaceis; gleba "pale slatey olive" (Ridgway) recens, "dark greenish olive" (Ridgway) siccata; locelli parvi, irregulares, partim sporis impleti; septa 12–30 μ, hyphis tenuibus gelatinosis dense compactis; basidia 17–20 × 5–6 μ, hyalina, cylindrica, sterigmatibus brevibus; sporae ellipsoideae, 7–10 × 4–5 μ, subbrunneae, leves, epispora crassa.

Fructifications spheroidal, irregular, 2 cm. in diameter, drying to 1.5 cm. in diameter or less, pale pink-violet, drying light

pinkish cinnamon to Sayal brown; mycelium not seen; columella branching at the base and penetrating to the center of the fructification as in *Jaczewskia;* fibrils not seen; peridium 320–375 μ thick, composed of spongy pseudoparenchyma, the outer portion of which is tinged brownish violaceous; gleba "pale slatey olive," drying dark greenish olive; cavities small, irregular, partially filled with spores; septa 12–30 μ thick (when distended after drying), composed of slender gelatinous hyphae closely woven; rhaches of the columella same as septa, but 25–50 μ thick; basidia 17–20 × 5–6 μ, hyaline, cylindric; sterigmata short; spores broadly ellipsoidal to obovoidal, 7–10 × 4–5 μ, slightly brownish, smooth with a rather thick epispore.

Specimens examined:

Exsiccati: Torrend, Mycoth. Lusitan. 90, under *Hysterangium clathroides* var.

Portugal: Mafra, *C. Torrend,* in Mycoth. Lusitan. 90 (in Farlow Herb.).

California: Marin County, Mt. Tamalpais, *H. E. Parks, 3049* (in Univ. Cal. Herb.).

Tasmania: Mt. Nelson, *L. Rodway, 1264,* cotype (in Dodge Herb. 354, and Zeller Herb. 7228).

9. Hysterangium inflatum Rodway, sp. nov.

Pl. 2, fig. 4; pl. 3, fig. 19.

Hysterangium inflatum Rodway, Roy. Soc. Tasmania Papers & Proc. **1917:** 108. 1918; **1923:** 156. 1924 (English description only).

Fructificationes subglobosae, circa 1 cm. diametro, quae siccatae indurescunt, cinnamoneo-rufae vel castaneae; peridium 65–160 μ crassitudine, subhyalinum sectum superficie brunnea, parenchymate, separabile; gleba dura siccata, "dark grayish blue-green" vel "greenish slate-black" (Ridgway) septis albidis, gelatinosa recens; locelli subglobosi, 240 μ diametro vel amplius, sporis impleti; septa 45–60 μ crassitudine, hyalina, hyphis magnis hyalinis 5–7 μ diametro metientibus contextis; basidia truncato-clavata, 18–22 × 7–9 μ, sterigmatibus brevibus, 3- vel 7-spora; sporae fusiformes, olivaceo-alutaceae acervatae, hyalinae sub lente, 12–17 × 5–7.5 μ, subappendiculatae, epispora inflata laevi, 14–18 × 10–11 μ metiente, spora longiore sed apice depresso.

Type: in Rodway Herb., cotype in Dodge Herb. and Zeller Herb.

Fructifications subglobose, about 1 cm. in diameter, becoming

very hard when dry, cinnamon-rufous to chestnut-brown; peridium 65–160 μ thick, light brown in section except the darker brown surface composed of parenchyma, separating from the gleba; gleba hard when dry, dark grayish blue-green to greenish slate-black, veined with whitish septa, very gelatinous when fresh; cavities subglobose, 240 μ or larger, filled with spores; septa 45–60 μ thick, hyaline, composed of large longitudinal hyphae 5–7 μ in diameter; basidia truncate-clavate, hyaline, 18–22 × 7–9 μ, with short sterigmata, 3–7-spored; spores fusiform, deep olive-buff in mass to almost hyaline singly under the microscope, 12–17 × 5–7.5 μ, slightly appendiculate, surrounded by a hyaline, smooth, inflated membrane measuring 14–18 × 10–11 μ, somewhat attenuated below, exceeding the spore below but depressed at the apex, exposing the tip of the spore.

California, New Zealand, and Tasmania.

Hysterangium inflatum has closer affinities to the genus *Dendrogaster* than do other species of *Hysterangium*. The inflated exospore is characteristic of *Dendrogaster* but in all other respects *H. inflatum* is like *Hysterangium*.

In young material, part of cotype, the spores are first without the inflated sheath. Some spores show only a shriveling of the outer wall, perhaps the beginning of sheath production.

Specimens examined:

California: Santa Clara County, Aldercroft, *H. E. Parks, 2026* (in Univ. Cal. Herb.).

Tasmania: Mt. Wellington, *L. Rodway, 1267*, cotype (in Dodge Herb. 342, and Zeller Herb. 7223).

New Zealand: Auckland, TeAroha, *G. H. Cunningham, 1189* (in Cunningham Herb.).

10. Hysterangium nephriticum Berkeley, Ann. & Mag. Nat. Hist. **13:** 350. 1844; Outlines Brit. Fungol. 294. 1860; Tulasne, Fung. Hypog. 82. 1851; Cooke, Handb. Brit. Fung. **1:** 358. 1870; De Toni in Sacc. Syll. Fung. **7:** 156. 1888; Hesse, Hypog. Deutschl. **1:** 104–105. 1891. Pl. 3, fig. 16.

Splanchnomyces nephriticum Corda, Icones Fung. **6:** 79. 1854.

Illustrations: Berkeley, Birmingham Nat. Hist. Soc. Rept. &

Trans. **1881:** *pl. 3, f. 10;* Corda, Icones Fung. **6:** *pl. 8, f. 79;* Hesse, Hypog. Deutschl. **1:** *pl. 7, f. 2, 5;* Massee, Ann. Bot. **4:** *pl. 1, f. 4* [Monogr. Brit. Gast. *pl. 1, f. 4*]; Brit. Fung. Fl. **1:** 11. *f. 4;* Smith, Brit. Basid. 490. *f. 143.*

Type: in Berkeley Herb. at Kew; fragment ex herb. Tulasne in Patouillard Herb. at Farlow Herb.

Fructifications 2–2.5 cm. in diameter, drying to less than 1 cm., white at first, drying clay-color or lighter; mycelium white, flat, branched, membranous; columella scarcely more than a sterile base with several branches, as in *Jaczewskia;* fibrils large, prominent and flaky at point of attachment; peridium duplex, 100–240 μ thick, easily separating, especially on drying, as the gleba contracts much more than the peridium, cartridge-buff in cross-section; outer part of first layer cottony, loosely woven, of hyaline, thick-walled hyphae about 6–7 μ in diameter, and inner part of parallel smaller hyphae, and the second layer of pseudoparenchyma about 40 μ thick; gleba at first cartilagineo-glutinous, "pale blue or gray in parts with a green tinge or even pinkish" in very young specimens, drying clay-color and fragile, with columella becoming Kaiser brown on drying; cavities small, nearly filled with spores; septa 85–120 μ thick, composed of loosely interwoven, hyaline hyphae 2–3 μ in diameter, with a tendency to become scissile; basidia cylindric, 2–3 × 17–18 μ long, hyaline, sterigmata short; spores ellipsoidal, 13–18 × 4–6 μ, slightly brownish, more or less stuck together by a gel.

Under *Quercus.* Europe and North America. September to February.

Fructifications of this species are found imbedded in a mass of white mycelial strands which are attached to them at several points. The gleba is first pinkish, then greenish, often drying clay color. The odor is not offensive.

Specimens examined:

England: near Bristol, *C. E. Broome 2/45* (J. W. Bailey Herb. 305, in Brown Univ. Herb.); *C. E. Broome* (in Curtis Herb. at Farlow Herb. and ex-Massee Herb. in N. Y. Bot. Gard. Herb.); near Clifton, *C. E. Broome,* type (in Patouillard Herb. at Farlow Herb.).

Maine: Kittery Point, *R. Thaxter* (in Farlow Herb.).

California: Marin County, Rattlesnake Camp, *H. E. Parks, 2174* (in Univ. Cal. Herb.); Santa Clara County, Guadaloupe, *H. E. Parks, 149, 385* (in Univ. Cal. Herb., Dodge Herb. 351, 352, and Zeller Herb. 7226, 1677).

11. Hysterangium crassirhachis Zeller & Dodge, sp. nov.

Pl. 1, fig. 4; pl. 3, fig. 20.

Fructificationes reniformes, albae dein "sea-shell pink" (Ridgway) vel carneae recens lectae, "pinkish buff" vel "snuff-brown" (Ridgway) siccatae; stipes 1–2 mm. diametro, albus, semper peridio albior siccatus, stuposus, subparallelibus vel anastomosantibus, hyalinis, hyphis 2–2.5 μ diametro compactus, cum capite in medio fructificationis crassissimo (⅓ diametro fructificationis metiente) ex quo radiant lamellae 300–450 μ crassitudine, tenaces, hyphis gelatinosis hyalinis contextis; peridium facile separabile, 400–500 μ crassitudine, pseudoparenchymate, cellulis 8–17 μ diametro strato extero cellulis brunneis 25 μ diametro; gleba gelatinosa recens "grayish olive" vel "deep grayish olive" (Ridgway); locelli simplices vel labyrinthiformes, vacui; septa 85–100, vel etiam 200 μ crassitudine, hyphis gelatinosis hyalinis contexta; basidia di- vel tetraspora, 30–50 × 6–9 μ, hyalinis; sterigmata brevia; sporae fusiformes leves, episporis crassis, uni- vel multiguttulatae breve appendiculatae hyalinae vel olivaceae acervatae, 13–22 × 4–8 μ.

In quercetis et aceretis. Oregon et California. Primo vere.

Type: in Zeller Herb., Dodge Herb., and Oregon Agr. Coll. Herb.

Fructifications spheroidal to depressed, often reniform, 1–2.5 cm. in diameter, white at first, becoming sea-shell pink to flesh-colored when fresh, drying pinkish buff to snuff-brown; stipe in a depression at the base, 1–2 mm. in diameter, white, drying somewhat lighter than the rest of the fructification, stupose, composed of more or less parallel and anastomosing, slender, hyaline hyphae 2–2.5 μ in diameter; columella neutral gray to slate-gray, opalescent when fresh, drying white, flinty, thick, terminating in a broad head at the center of the fructification, covering about one-third of the median vertical section, whence radiate distinct, percurrent branches which are usually at least 300–450 μ thick, tough, composed of highly gelatinized, hyaline, interwoven hyphae; peridium easily separable, 400–500 μ thick, duplex, inner and major portion parenchymatous, composed of hyaline rhomboidal cells, 8–17 μ in diameter, with an outer rind of smaller, thin pseudoparenchyma of brownish cells about 25 μ thick; gleba gelatinous, from grayish olive to deep grayish

olive when fresh; cavities radiating from the columella to the peridium, sometimes simple, appearing as linear openings in sections, but usually labyrinthiform, broken by septa jutting out from the columellar branches on either side, not filled; septa from 85–100 up to 200 μ broad, of interwoven, hyaline hyphae, highly gelatinized; basidia 2–4-spored, 30–50 × 6–9 μ, hyaline; sterigmata short; spores fusiform, smooth, thick-walled, sometimes 1–many-guttulate, hyaline to olivaceous in mass, 13–22 × 4–8 μ, short-appendiculate.

Under *Quercus* and *Acer*. Oregon and California. May.

These plants are characterized by the brittle peridium, which is easily separable when fresh, and by the tough, rubbery gleba with its large translucent septa which become flinty when dry.

Specimens examined:

Oregon: Benton County, Corvallis, *L. M. Boozer*, type (in Zeller Herb. 2319, Dodge Herb. 334, and Oregon Agr. Coll. Herb. 4862); *L. M. Boozer* (in Zeller Herb. 2320); Sulphur Springs, *Helen M. Gilkey* (in Oregon Agr. Coll. Herb. 4861, 4860, and Zeller Herb. 2343, 2348).

California: Marin County, San Rafael, *H. E. Parks, 3037* (in Univ. Cal. Herb.); Santa Clara County, Alma, *H. E. Parks, 156* (in Dodge Herb. 338, Zeller Herb. 7219, and Univ. Cal. Herb.); Mt. Umunhum, *H. E. Parks, 897* (in Univ. Cal. Herb., Dodge Herb. 340, and Zeller Herb. 7220); Saratoga, *H. E. Parks, 815, 2160* (in Dodge Herb. 339, 2851, and in Univ. Cal. Herb.).

12. Hysterangium Harknessii Zeller & Dodge, sp. nov.

Pl. 3, fig. 24.

Hysterangium australe Harkness, Cal. Acad. Sci. Proc. III. **1:** 256. 1899, *not H. australe* Spegazzini, Soc. Cientif. Arg. Anal. **11:** 242–243. 1881 [often cited as Fung. Arg. **4:** 94. 1881].

Type: in Dudley Herb. at Leland Stanford Jr. Univ.

Fructificationes ellipsoideae, 1 × 1 × 1.5 cm. metientes, argillaceae vel fulvae; columella tenuior; peridium tenue, 90–135 μ crassitudine, intus tenuibus hyphis 3–4 μ diametro minusve, hyphis exteris superficiei fructificationis perpendicularibus; gleba viridis, locellis luteis, subimpletis; septa 120–300 μ crassitudine, hyphis magnis laxe implexis, gelatinosis; basidia non visa; sporae 13–18 × 5–6 μ, fusiformes, subappendiculatae, luteae.

In quercetis. California.

Type: in Dudley Herb. at Leland Stanford Jr. Univ.

Fructifications ellipsoidal, 1 × 1 × 1.5 cm., clay-color to tawny; columella branching, slender; peridium thin, 90–135 μ thick, composed of thick-walled hyphae 3–4 μ in diameter, duplex, the inner portion compact, pseudoparenchymatous, cells mostly periclinal, 40–50 μ, the outer 50–85 μ, composed of loosely interwoven radial hyphae; gleba dark green, with yellowish cavities, nearly filled; septa 120–300 μ thick, composed of large, thin-walled, loosely interwoven, gelatinizing hyphae; basidia not seen; spores 13–18 × 4–6 μ, fusiform, slightly appendiculate, yellowish.

Under *Quercus*. California. April.

Harkness referred four specimens to *Hysterangium australe* Spegazzini, of which Nos. 119 and 140 are *H. clathroides*, No. 155 is *Hysterangium* sp., and No. 84, the only specimen mentioned by number by Harkness (*l. c.*), is taken as the *type* of *H. Harknessii*. The outer layer of the peridium is almost identical with that of *H. strobilus*, but the inner layer is pseudoparenchymatous while in *H. strobilus* it is parenchymatous. These two species also differ in dimensions of sterile tissues and in color and texture of the gleba.

Specimens examined:

California: Marin County, Mt. Tamalpais, *H. W. Harkness, 84*, type (in Dudley Herb. at Leland Stanford Jr. Univ.).

13. Hysterangium cinereum Harkness, Cal. Acad. Sci. Proc. III. **1:** 254. 1899; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 245. 1902.

Illustrations: Harkness, Cal. Acad. Sci. Proc. III. **1:** *pl. 42, f. 2.*

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ.

Fructifications depressed-globose, 1 × 2 cm., cinnamon to bister in alcohol; fibrils scanty, small, concolorous, base not prominent; columella large at base, branching; peridium duplex, 300 μ thick, outer layer of dark brown hyphae 4–5 μ in diameter, inner layer of gelatinized hyphae 3–8 μ in diameter, compact; gleba firm, dark olive-buff to citrine-drab; cavities empty; septa 80–90 μ thick, of compact, gelatinized hyphae; basidia cylindric, 10–14 × 4–5 μ; sterigmata 11–12 μ long; spores greenish yellow, rhomboid-ellipsoidal to allantoid, 12–16 × 4–7 μ.

Under *Arctostaphylos* and *Quercus*. California. February to June.

Specimens examined:

California: Placer County, Auburn, *H. W. Harkness, 31*, cotype (in Dudley Herb. at Leland Stanford Jr. Univ.); Marin County, Mt. Tamalpais, *H. E. Parks, 3050* (in Univ. Cal. Herb.); San Rafael, *H. E. Parks, 2043* (in Univ. Cal. Herb.); San Mateo County, Redwood Park, *H. E. Parks, 2190* (in Univ. Cal. Herb.); Santa Clara County, Aldercroft Creek; *H. E. Parks, 1153*, and *C. W. Dodge* (in Dodge Herb. 1522); Saratoga, *H. E. Parks, 1155*, and *C. W. Dodge* (in Dodge Herb. 1524).

14. Hysterangium membranaceum Vittadini, Monogr. Tuberac. 14. 1831; Tulasne, Fung. Hypog. 83. 1851; Winter in Rabenhorst, Krypt. Fl. Deutschl. ed. 2, I. **1:** 879. 1883; DeToni in Sacc. Syll. Fung. **7:** 156. 1888; Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 26. 1912; **1923:** 157. 1924. Pl. 3, fig. 17.

Splanchnomyces membranaceus Corda, Icones Fung. **6:** 41. 1854.

Illustrations: Vittadini, Monogr. Tuberac. *pl. 4, f. 15;* Corda, Icones Fung. **6:** *pl. 8, f. 78;* Patouillard, Tab. Anal. *f. 364.*

Type: location unknown to us.

Fructifications nearly spherical, 0.8–1 cm. in diameter, cream-color when fresh, drying tilleul-buff to wood-brown; columella short and inconspicuous, not extending more than half way to the center of the fructification; peridium thin, membranous, papery, separable, 25–55 μ thick, composed of parallel, thin-walled, brownish hyphae; gleba court-gray when fresh, becoming warm buff when dry; cavities minute and irregular; septa very thin, 10–15 μ, sometimes scissile; basidia narrow-cylindrical, 2–3-spored; spores almost hyaline, about 7.5–11 × 5–6 μ, ovate to ellipsoidal.

Under *Acer*. Cosmopolitan. July in Tasmania, October in Oregon.

Specimens are tiny and quite ill-scented, like musty wine.

Specimens examined:

Oregon: Linn County, *S. M. Zeller, 2584* (in Oregon Agr. Coll. Herb. 4865, and Zeller Herb.).

Tasmania: Hobart, *L. Rodway* (in Lloyd Mus. 083); Cascades, *L. Rodway, 1270* (in Dodge Herb. 345, and Zeller Herb. 7224); Waterworks, *L. Rodway, 1120* (in Lloyd Mus.).

15. Hysterangium fuscum Harkness, Cal. Acad. Sci. Proc. III. **1:** 257. 1899; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 247. 1902. Pl. 3, figs. 4, 14.

Hysterangium Gardneri E. Fischer in Fedde, Rep. Nov. Sp. **7:** 194. 1909; Saccardo & Trotter in Sacc. Syll. Fung. **21:** 495. 1912.—*H. Gardneri* E. Fischer, Ber. d. deut. bot. Ges. **25:** 276. 1907 (nom. nud.); Bot. Zeit. **66:** 164–166. 1908.

Illustrations: E. Fischer, Bot. Zeit. **66:** *pl. 6, f. 19.*

Type: cotype in Dudley Herb. at Leland Stanford Jr. Univ.

Fructification spherical, 1–2 cm. in diameter, buckthorn-brown to mummy-brown and clover-brown in alcohol; fibrils scarce, not prominent although becoming nearly free below, innate-appressed above, concolorous, hence inconspicuous; columella percurrent or nearly so, slender, not conspicuously branched; peridium 200–235 μ thick, of coarse, thick-walled, closely interwoven, dark brown hyphae; gleba isabella color to olive-brown; septa 45–75 μ thick, of fine gelatinized hyphae; basidia ellipsoidal with short sterigmata; spores yellow-brown, fusiform, 10–12 × 4–5 μ.

Under *Eucalyptus*. California. March.

Specimens examined:

California: Marin County, Mill Valley, *H. W. Harkness, 177*, cotype (in Dudley Herb. at Leland Stanford Jr. Univ.); Alameda Co., Shepard Canon near Oakland, *H. E. Parks, 1167, 1172*, and *C. W. Dodge, 1586, 1589* (in Univ. Cal. Herb., Dodge Herb., and Zeller Herb. 7189); Berkeley, *N. L. Gardner*, type of *H. Gardneri* (in Univ. Cal. Herb. 214).

16. Hysterangium rubricatum Hesse, Jahrb. f. wiss. Bot. **15:** 631. 1884; Hypog. Deutschl. **1:** 95–97. 1891; DeToni in Sacc. Syll. Fung. **7:** 491. 1888. Pl. 3, fig. 27.

Illustrations: Hesse, Jahrb. f. wiss. Bot. **15:** *pl. 32;* Hypog. Deutschl. **1:** *pl. 1, f. 1–5; pl. 5, f. 13, 14; pl. 6, f. 1, 9, 10.*

Type: not seen, but authentic material from Hesse in Farlow Herb.

Fructifications variable in size, 1–4 cm. in diameter, spherical to reniform; columella usually drying to slender, branched, dendroid veins, from a slight thickening at the base; peridium 150–400 μ thick, at first white, drying light ochraceous buff to russet, the outer portion very compact, with abundant crystals of calcium oxalate, the inner layers composed of more loosely woven hyphae, with clamp-connections and studded with oxalate crystals; gleba pale purplish to light pink when fresh (Parks), drying fragile, usually pinkish buff to Sayal brown; cavities labyrinthiform, small; septa hyaline, 25–100 μ thick, composed of compact, parallel hyphae; basidia mostly 2-spored, hyaline, 16–18 × 6–7 μ; sterigmata short; spores broadly fusiform, granular, hyaline to light buff in mass, appendiculate, smooth, 12–17 × 5–8 μ.

Under *Quercus*, *Arbutus*, and *Fagus*. Pacific Coast of North America and Germany. Spring.

Large groups of fruiting bodies are often found on one mycelium. They are first white, becoming reddish brown on exposure to the air.

Specimens examined:

Germany: *R. Hesse* (in Farlow Herb., also ex Mattirolo, 19, in Lloyd Mus.).

Oregon: Corvallis, *S. M. Zeller*, *7193* (in Oregon Agr. Coll. Herb. 4870, and Zeller Herb.).

California: Marin County, San Rafael, *H. E. Parks*, *2109*, *2123* (in Univ. Cal. Herb.); Santa Clara County, Alma, *H. E. Parks*, *157*, *468* (in Univ. Cal. Herb., in Dodge Herb. 363, 364, and in Zeller Herb. 1680, 7230), and Guadaloupe Mines, *H. E. Parks*, *141*, *386*, *413*, *861*, *959* (in Univ. Cal. Herb., in Dodge Herb. 360, 361, 359, 1500, 358, and in Zeller Herb. 1676, 1693, 7195, and 7194); Saratoga, *H. E. Parks*, *Z20*, *Z23*, *451* (in Zeller Herb. 1684, 1687, 7231).

17. Hysterangium Pompholyx Tulasne, Ann. Sci. Nat. Bot. II. **19:** 375. 1843; Fung. Hypog. 83–84. 1851; DeToni in Sacc. Syll. Fung. **7:** 157. 1888; ? Coker & Couch, Gast. E. U. S. & Can., 19–20. 1928. Pl. 3, fig. 23.

Illustrations: Tulasne, Ann. Sci. Nat. Bot. II. **19:** *pl. 17, f. 17–19;* Fung. Hypog. *pl. 2, f. 3; pl. 11, f. 6.*

Type: fragment from Tulasne Herb. in Patouillard Herb. at Farlow Herb.

Fructification at first white, becoming reddish and then dark brown, 1–1.5 cm. in diameter, globose to depressed-globose, surface with flakes of white mycelium or flocculent with more or less fascicled hyphae; columella extending three-fourths the length of the fructification, branched; peridium 300–600 μ thick, composed of septate hyphae more or less braided together, variable in size, with enlarged, irregular cells, darker brown toward the surface, hyaline within, the open canals in the peridium being about 20–22 μ in diameter; gleba at first white, then dull reddish brown, drying buffy olive to light brownish olive, compact; cavities radially arranged; septa 90–120 μ thick, composed of parallel, compact, hyaline hyphae; basidia large, cylindric, 35–40 × 7–8 μ; spores dilute olivaceous in mass, 12–14 × 5–6 μ, short elliptic-fusiform, apices usually rounded, sometimes with a slightly roughened exospore.

Under *Carpinus* and *Fagus*. France and eastern North America.

Specimens examined:

France: Aisne, Foret de Marly, *N. Patouillard* (in Patouillard Herb. at Farlow Herb.); Seine et Oise [? Meudon], *L. R. Tulasne*, type (fragment in Patouillard Herb. at Farlow Herb.).

Maine: Kittery Point, *R. Thaxter*, "6 Je '86" (in Thaxter Herb.).

Tennessee: Burbank, *R. Thaxter* (in Thaxter Herb. B3H).

18. Hysterangium cistophilum (Tulasne) Zeller & Dodge, sp. nov.
Pl. 2, fig. 2; pl. 3, fig. 22.

Hysterangium clathroides Tulasne in Durieu de Maison-Neuve, Expl. Sci. de l'Algérie, Bot. **1:** 395. 1846–1849.—*H. clathroides* Vittadini var. *cistophilum* Tulasne, Fung. Hypog. 81. 1851; Bataille, Soc. Myc. France Bull. **39:** 168. 1923.

Illustrations: Durieu de Maison-Neuve, Expl. Sci. de l'Algérie, Bot. **1:** *pl. 24, f. 7–11.*

Type: R. Maire, Mycoth. Bor.-Afric. **13:** 311.

Fructifications spherical to reniform, 1–2.5 cm. in diameter, at first white, becoming red-brown on exposure, drying pinkish buff to tawny olive, growing from ramose, white rhizomorphs;

columella not well developed but, when apparent, dendroid with thin branches; peridium tough, 70–170 μ thick, scarcely separable in young specimens to easily separable at maturity, loosely to closely stupose, composed of brownish hyphae, mostly parallel to the surface; gleba dark green (Parks) or deep olive (Tulasne and Thaxter) when fresh, becoming buffy citrine to olive-citrine when dry; cavities small but long and narrow, mostly arranged radially with reference to their longest diameter, empty; septa 50–120 μ thick, hyaline, composed of compact, parallel hyphae, somewhat gelatinized; basidia obovate to clavate, 2–4-spored, 10–18 × 5–6 μ, sterigmata short; spores almost sessile, fusiform, yellowish to dilute olivaceous under the microscope, slightly appendaged, smooth, 10–17 × 6–7.5 μ (average 13.1 ± 0.7 × 6.5 μ). Odor similar to that of ether (Tulasne).

Gregarious or singly under a thin layer of leaves. Under *Quercus*, *Arbutus*, *Eucalyptus*, and *Pistacia*. Cosmopolitan.

A fragment ex herb. Tulasne, without locality, in the Patouillard Herb. at the Farlow Herb. agrees with the above in all respects.

Specimens examined:

Exsiccati: R. Maire, Mycoth. Bor.-Afric. **13:** 311, under the name *Hysterangium clathroides* Vitt. var. *cistophilum* Tul.; Migula, Cryptog. Germ. Austr. et Helv. Exsicc. 191, under the name *Hysterangium clathroides* Vitt.

Austria: Wiener Wald, *F. von Hoehnel* (in von Hoehnel Herb. at Farlow Herb.).

Czechoslovakia: Cechy, *F. Bubak*, in Migula, Cryptog. Germ. Austr. et Helv. Exsicc. 191, under the name *Hysterangium clathroides* Vitt. (in Farlow Herb. at Harvard Univ.).

Germany: Eisenkaute, *R. Hesse* (Herb. Bot. Inst. Univ. Marburg).

Algeria: Baali prés Souma, *A. Duvernoy & R. Maire*, type, in R. Maire, Mycoth. Bor.-Afric. **13:** 311, under the name *Hysterangium clathroides* Vitt. var. *cistophilum* Tul. (in Farlow Herb. at Harvard Univ.).

Oregon: Benton County, Corvallis, *S. M. Zeller, 7197* (in Oregon Agr. Coll. Herb. 4856, and Zeller Herb.).

California: Santa Clara County, Saratoga, *H. E. Parks, 292,*

980 (in Dodge Herb. 2127, 2128, and in Zeller Herb. 7198); Guadaloupe, *H. E. Parks, 148* (in Dodge Herb. 2130, and Zeller Herb. 7201).

Chile: Punta Arenas, *R. Thaxter*, two collections (in Thaxter Herb.).

19. Hysterangium Fischeri Zeller & Dodge, sp. nov.

Pl. 1, fig. 2; pl. 3, fig. 8.

Hysterangium sp. (near *H. siculum*) E. Fischer, Ber. d. deut. bot. Ges. **25**: 375–376. 1907.—*Hysterangium* Nr. 258, E. Fischer, Bot. Zeit. **66**: 163–164. 1908.

Type: in Univ. Cal. Herb.

Fructificationes irregulares, depresso-globosae, 2–3.5 × 1–2 cm. metientes, "Natal brown" servatae, "avellaneous" vel "wood-brown" siccatae; columella basi ramosa, tenuis; peridium 90–200 μ crassitudine, stuposum, hyphis magnis, granulosis, flavo-brunneis, 5–8 μ diametro, extus laxe implexis, intus tenuioribus compacte contextis; gleba "buffy citrine" vel "olive citrine"; locelli parvi, irregulares, sporis impleti; septa 35–80 μ crassitudine, hyphis tenuibus, 3–5 μ diametro contexta, gelatinosa; basidia 2–5-spora, 10–12.6 × 2.5–5.5 μ; sporae "old gold," ellipsoideae, basi truncatae, laeves, 8–11 × 4–5.5 μ.

Fructifications irregularly depressed-globose, 2–3.5 × 1–2 cm., Natal brown, drying avellaneous to wood-brown; columella branching almost at the base of the fructification, slender, inconspicuous; peridium 90–200 μ thick, stupose, composed of granulose, large, thin-walled, yellow-brown hyphae 5–8 μ in diameter, loosely woven toward the outside, slightly smaller and more compactly woven within; gleba buffy citrine to olive-citrine; cavities very small, irregular, filled with spores; septa 35–80 μ thick, composed of slender, thin-walled hyphae 3–5 μ in diameter, becoming highly gelatinized at maturity; basidia obscure, 2–5-spored, 10–12.6 × 2.5–5.5 μ; spores acrogenous, old-gold, ellipsoidal, often truncate at the base, smooth, 8–11 × 4–5.5 μ. No odor.

Under *Quercus* and *Eucalyptus*. Oregon, California, and Australia. February to May.

Specimens examined:

Oregon: Corvallis, *S. M. Zeller, 7056* (in Oregon Agr. Coll. Herb. 4863, and Zeller Herb.).

California: Alameda County, Berkeley, *W. A. Setchell & C. C. Dobie*, type (in Univ. Cal. Herb. 258); Oakland, *C. W. Dodge &*

H. E. Parks, 1166 (in Dodge Herb. 1579, and Zeller Herb. 7221); San Mateo County, Redwood Park, *H. E. Parks & Martha Watson, 13* (in Univ. Cal. Herb. 2229); Santa Clara County, Alma, *H. E. Parks, 997* (in Univ. Cal. Herb.).

Australia: Victoria, *F. Martin, 467* (in Kew Herb.).

EXTRA-LIMITAL SPECIES

1. Hysterangium purpureum Zeller & Dodge, sp. nov.

Pl. 1, fig. 5; pl. 3, fig. 21.

Fructificationes ad 2 cm. metientes, laete lavendulicoloris, purpurascentes tactu, siccatae "grayish olive" vel "citrine drab" (Ridgway), "dull purplish black" (Ridgway) servatae; funiculi nulli; stipes ad 4 mm. longitudine, unde multae rhizomorphae nascuntur; columella arborea, in medio fructificationis percurrens; peridium 520–950 μ crassitudine, cellulis pseudoparenchymatibus ad 16–17 μ diametro metientibus, minoribus extus; gleba purpureo-brunnea, vel nigro-brunnea (teste Thaxtero), "benzo brown to hair-brown" (Ridgway) siccata; septa variabilia, 25–95 μ crassitudine, gelatinosa, hyphis tenuibus, 1 μ diametro contexta hyphis majoribus in septis crassioribus; basidia tetraspora, 25–30 × 5–7 μ, cylindrica, sterigmatibus brevibus; sporae sessilles, 13–16 × 5–6 μ, elongato-ellipsoideae vel ovatae, obtusae.

Type: in Thaxter Herb.

Fructifications up to 2 cm. in diameter, bright, deep lavender, becoming purplish red on handling and dull purplish red when fully matured, drying grayish olive to citrine drab, becoming dull purplish black in alcohol, coloring alcohol and paper purple; fibrils absent; stipe continuous with the columella, up to 4 mm. long, terminating in many branching rhizomorphs; columella dendroid, reaching beyond the center of the fructification; peridium 520–950 μ thick, duplex, outer layer purplish brown, 90–120 μ thick, parenchymatous, composed of smaller cells on the outside, becoming larger within, inner layer 640–830 μ thick, rather falsely pseudoparenchymatous, hyaline or with vinaceous tints, pierced tangentially by large hyphae which are often vesicular and up to 16–17 μ in diameter; gleba purplish brown to blackish brown in fully matured specimens (Thaxter field notes), drying benzo brown to hair-brown after removing from alcohol; septa more hyaline in section than inner peridium, variable in thickness from 25 to 95 μ, gelatinized, composed of small hyaline hyphae 1 μ in diameter; basidia 4-spored, 25–30 × 5–7 μ, cylindrical; spores sessile, 13–16 × 5–6 μ, long-ellipsoidal or tapering toward the basidium, obtuse, vinaceous *in mass*.

This is a beautiful purple species having a duplex peridium of two types of parenchyma, the inner of which has rather large, irregular, intercellular cavities. It approaches *H. Phillipsii* in its radicate base. *H. purpureum* is strikingly distinct from all other species in color and peridial characters.

Specimens examined:

Chile: Magellanes, Punta Arenas, *R. Thaxter, Hypog. 12*, type (in Thaxter Herb. and fragment in Zeller Herb. 7232).

2. Hysterangium stoloniferum Tulasne, Ann. Sci. Nat. Bot. II. **19:** 376. 1843; Fung. Hypog. 84–85. 1851; Winter in Rabenhorst, Krypt. Fl. Deutschl. ed. 2, I. **1:** 879. 1883; DeToni in Sacc. Syll. Fung. **7:** 157. 1888; Hesse, Hypog. Deutschl. **1:** 100–101. 1891; Th. M. Fries, Svensk Bot. Tidskr. **3:** 281. 1909; Th. C. E. Fries, Arkiv f. Bot. **17**[9]**:** 19. 1921. Pl. 3, fig. 13.

Illustrations: Tulasne, Fung. Hypog. *pl. 11, f. 8;* Fourquignon, Champ. Super. 125; Hesse, Hypog. Deutschl. **1:** *pl. 1, f. 6–9.*

Type: portion in Patouillard Herb. at Farlow Herb.

Fructifications spherical, "the size of a filbert," smooth, white, drying to 4 mm., Isabella color; stipe prolonged into a long cylindrical, solid, white radicle, sparsely branched; columella nearly percurrent, drying 300–400 μ thick; peridium membranaceous, at length subcoriaceous, easily separable, drying 400 μ thick, composed of parenchyma with cells 5–6 μ in diameter; gleba bluish in young material, becoming grayish fuscous and drying cinnamon-buff; cavities elongate, radiating from the whole length of the columella, filled with spores; basidia slender, cylindrical, mostly 2-spored, sterigmata short; spores ellipsoidal, smooth, light yellow under the microscope, dirty brown in mass, 16.6–23.2 × 6–7 μ, mean length 19.7 ± 0.95 μ, appendiculate.

Under decaying oak leaves. Central Europe. Autumn.

The above reference of Hesse is doubtful since he reports the peridium as composed of slender parallel hyphae, larger in diameter toward the outside and tapering towards the gleba.

Specimens examined:

Exsiccati: L. Fuckel, Fung. Rhenani Suppl. 2616.

Hungary: Prencsfalu near Jalsava, *A. Kmet* (in Lloyd Mus. 1921).

Germany: Hessen Nassau, Eisenkaute, *R. Hesse VII, 91* (in Herb. Bot. Inst. Univ. Marburg, as *H. coriaceum*); Rabenkopf bei Oestrich, *L. Fuckel,* Fung. Rhenani Suppl. 2616 (copy in Farlow Herb.).

France: Poitou, near Bonnes, *L. R. Tulasne,* type (portion in Patouillard Herb. at Farlow Herb.).

2a. Var. **rubescens** (Quelet) Zeller and Dodge, n. comb.

Hysterangium clathroides Vittadini var. *rubescens* Quelet, Enchiridion Fung. 246. 1886.—*H. rubescens* Patouillard, Soc. Myc. France Bull. **30:** 351–352. 1914; *not* Tulasne, Ann. Sci. Nat. Bot. **19:** 375. 1843.

H. clathroides Quelet, Soc. d'Emul. Montbéliard, Mem. II. **4:** 375. 1873 [Champ. Jura Vosges **2:** 375. 1873]; *not* Vittadini, Monogr. Tuberac. 13–14. 1831.

H. clathroides Vittadini var. *mutabile* Bucholtz, Soc. Imp. Nat. Moscou Bull. **1907:** 467. 1908; Saccardo & Trotter in Sacc. Syll. Fung. **21:** 495. 1912.

Illustrations: Quelet, Soc. d'Emul. Montbéliard Mem. II. **4:** *pl. 4, f. 5* [Champ. Jura Vosges **2:** *pl. 4, f. 5*].

Type: location unknown to us, type of *H. rubescens* Patouillard in Patouillard Herb. at Farlow Herb.

The variety differs from the species in its becoming grayish red on exposure or to the touch, its gleba being buffy olive instead of cinnamon-buff; spores 21–23 × 6–7 μ.

Under *Quercus* and *Tilia.* France and Russia.

Quelet figures his plant as stoloniferous and small, although he refers it to *H. clathroides.* The material in the Patouillard Herbarium was first determined as *H. clathroides,* then *H. stoloniferum,* before it was published in its present position. (We have been unable to find microscopic characters to separate it from the species.) Variety *mutabile* Bucholtz appears to be the same, although we have not seen the type. It was described with slightly larger spores, 21–23 × 6–7 μ.

Specimens examined:

France: [Jura, between Lons le Saunier and Leponay], *N. Patouillard* (three collections in Patouillard Herb. at Farlow Herb.).

3. Hysterangium neocaledonicum Patouillard, Soc. Myc. France Bull. **31:** 34. 1915; Trotter in Sacc. Syll. Fung. **23:** 598. 1925. Pl. 3, fig. 29.

Type: in Patouillard Herb. at Farlow Herb., Harvard Univ.

Fructifications fleshy, oblong-spherical, 2–3 cm. in diameter, rose-color, becoming brownish in alcohol, each borne on a tough and hard rhizomorph; surface of the fructification costate, marked with furrows rising at the base and extending to the top; peridium membranaceous, easily separable, 120–320 μ thick, pseudoparenchymatous, composed of ovoid cells about 20 μ in diameter; gleba subgelatinous, elastic, ochraceous; columella dendroid, branched; septa radiating from the base, 75–120 μ broad; cavities minute, irregular, filled with spores at maturity; basidia short, 4-, rarely 2-, spored; spores subsessile, ellipsoid-elongate, smooth, almost mucronate at the apex or obtusely rounded, subhyaline, appendiculate, 14–16 × 4–5 μ.

Specimens examined:

Loyalty Islands: New Caledonia, *M. Le Rat*, type (in Patouillard Herb. at Farlow Herb.).

4. Hysterangium coriaceum Hesse, Hypog. Deutschl. **1:** 101. 1891; Saccardo, Syll. Fung. **11:** 168. 1895.

Illustrations: Hesse, Hypog. Deutschl. **1:** *pl. 7, f. 24; pl. 9, f. 5.*

Type: in Herb. Bot. Inst. Univ. Marburg.

Fructifications globose, 1–1.5 cm. in diameter, smooth and white, becoming flesh-red on handling or in light, Verona brown to snuff-brown in alcohol; columella highly developed in the central part of the gleba, light brown; peridium 300–500 μ thick, leathery, easily separable from the gleba, with a very thin outer layer of light brown, closely grouped hyphae; next within, a layer of pseudoparenchyma, thick and violet-colored under the microscope, with another layer of thin-celled, almost colorless hyphae next to the gleba; gleba gray to olive-green, light brownish olive in alcohol, cavities frequently circular in section; septa 130–150 μ thick, composed of hyaline gelatinized hyphae; basidia narrow-cylindrical, mostly 2-spored; sterigmata short; spores 8–12 × 3–4 μ, slightly appendiculate, slightly brownish in mass with a thick epispore.

Under *Betula*, *Corylus*, and *Fagus silvatica*. Germany. Autumn.

Fructifications turn cherry-red when first placed in alcohol, but the alcohol becomes completely decolorized in a few weeks, and the specimens brownish. Perhaps this species should be regarded as a variety of *H. clathroides*, from which it differs in having a slightly thicker peridium, more brownish gleba, and smaller spores.

Specimens examined:

Germany: Eisenkaute, *R. Hesse* (in Herb. Bot. Inst. Univ. Marburg).

5. Hysterangium siculum Mattirolo, Malpighia **14:** 86. 1900; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 246–247. 1902; E. Fischer, Ber. d. deut. bot. Ges. **25:** 375. 1907.

Illustrations: Mattirolo, Malpighia **14:** *pl. 1, f. 8–10.*

Type: location unknown to us.

Fructifications globose or depressed-globose, gregarious, white at first, becoming reddish and finally brownish on exposure, coloring alcohol brown; peridium thick, firm, duplex, the outer layer 90–120 μ thick, pseudoparenchymatous, inner layer fibrous, of the same texture as the gleba; gleba bright olivaceous to glauco-virescent; cavities narrow, unequal, mostly linear-elongate, basidia 2–4-spored; sterigmata short; spores ellipsoid, hyaline, smooth, virescent in mass, 18 × 6 μ.

Sicily. April.

Nearest to *H. clathroides*, from which it differs in the texture of the peridium and the size of the spores. Calcium oxalate crystals are often found in the peridium and gleba. *H. siculum* differs from *H. Fischeri* in the duplex peridium and size of spores.

6. Hysterangium Thaxteri Zeller & Dodge, sp. nov.

Pl. 2, fig. 5; pl. 3, fig. 28.

Fructificationes ad 1.5 cm. servatae, "russet" vel "Mars brown" (Ridgway); funiculi tenues, copiosi, liberi, concolores; peridium crassum, 2000–3300 μ crassitudine, duplex, strato extero 140–200 μ, hyphis dense compactum, 4–5 μ diametro, strato intero 1860–3160 μ crassitudine, hyphis laxe implexis, 2–4 μ diametro; gleba "argus-brown" (Ridgway); columella recta, 1 mm. crassitudine, cylindrica, non ramosa, in medio gelatinosa; septa 40–45 μ crassitudine, hyphis nodosis, 2–3 μ diametro, laxe implexis; basidia oblongo-clavata, 4–6-spora, 1.5–2 × 7–9 μ, sterig-

matibus brevibus, tenuibus; sporae brunneae acervatae, singulae, hyalinae, ellipsoideae, 3–4 × 1.5–2 μ.

Type: in Thaxter Herb.

Fructifications shrinking to 1.5 cm. in alcohol and glycerine, russet to Mars brown; fibrils slender, abundant, free, concolorous; peridium 2–3.3 mm. thick, duplex, the outer layer 140–200 μ thick, of thick-walled, hyaline, densely woven hyphae 4–5 μ in diameter, inner layer 1860–3160 μ thick, composed of loosely woven, thin-walled hyphae 2–4 μ in diameter, with clamp connections, imbedded in a gel; gleba argus brown; columella straight, 1 mm. thick, cylindric, unbranched, gelatinous in the central third of its diameter; septa 40–45 μ thick, composed of loosely woven, nodose, thin-walled hyphae 2–3 μ in diameter, imbedded in a gel; basidia oblong-clavate, 4–6-spored, 1.5–2 × 7–9 μ; sterigmata short, very fine, about 1 μ long; spores smooth, nearly hyaline singly, but brown in mass, 3–4 × 1.5–2 μ, ellipsoidal.

Brazil and Argentina.

Hysterangium Thaxteri is characterized by its very thick peridium and the nodose hyphae of inner peridium and septa.[1]

Specimens examined:

Argentina: Buenos Aires, *R. Thaxter*, type (in Thaxter Herb.).

Brazil: Rio Grande do Sul, Parecy Novo on Rio Cahy, *J. Rick*, *145* (in Farlow Herb.).

7. Hysterangium pumilum Rodway, sp. nov.

Pl. 1, fig. 3; pl. 3, fig. 25.

Hysterangium pumilum Rodway, Roy. Soc. Tasmania Papers & Proc. **1917:** 109. 1918; **1923:** 155. 1924 (English description only).

Fructificationes sphericae, 0.2–0.25 cm. diametro metientes, laeves albidae siccatae; funiculi nulli; columella non prominens; peridium tenue, 30–50 μ crassitudine, simplex, tenuibus brunneis hyphis 2–3 μ diametro contextum; gleba "old gold" vel "Saccardo's olive" (Ridgway); locelli angulares, sporis impletis; septa tenua, 25–60 μ crassitudine, hyphis laxe implexis, 6–7 μ diametro metientibus, non gelatinosa; basidia subclavata, curvata, 35–40 × 10–13 μ, sterigmatibus tenuibus; sporae hyalinae, 14–15 × 4–5 μ, fusiformes, finibus perobtusis.

[1] *Rick, 145*, from Brazil, has been attacked by *Penicillium* sp. and the fructifications disorganized beyond recognition but the texture and color of the peridium and the small spores indicate this species.

Type: in Rodway Herb., cotype in Dodge Herb. and Zeller Herb.

Fructifications spherical, 0.2–0.25 cm. in diameter, smooth, white when dry; fibrils none; columella not prominent; peridium 30–50 μ thick, simplex, composed of slender, thick-walled, brown hyphae 2–3 μ in diameter; gleba old gold to Saccardo's olive; cavities polyhedral, filled with spores; septa 25–60 μ thick, composed of loosely woven, thin-walled hyphae 6–7 μ in diameter, much collapsed and disintegrating in cotype material but not gelatinizing; basidia 35–40 × 10–13 μ, subclavate to curved from procumbent position; sterigmata short; spores hyaline, 14–15 × 4–5 μ, fusiform with very obtuse ends.

In heathy soil. Tasman's Peninsula.

In some of the material the spores have begun to germinate, and in some instances seem to be conjugating in pairs.

Specimens examined:

Tasmania: Wedge Bay, *L. Rodway, 1268*, cotype, *1121* (in Rodway Herb., Dodge Herb. 357, Zeller Herb. 7229, and Lloyd Mus. 082).

8. Hysterangium Thwaitesii Berkeley & Broome, Ann. & Mag. Nat. Hist. II. **2:** 267. 1848; Tulasne, Fung. Hypog. 82–83. 1851; Berkeley, Outl. Brit. Fungol. 294. 1860; Cooke, Handb. Brit. Fung. **1:** 358. 1870; DeToni in Sacc. Syll. Fung. **7:** 156. 1888; Hesse, Hypog. Deutschl. **1:** 105. 1891. Pl. 3, fig. 18.

Illustrations: Hesse, Hypog. Deutschl. **1:** *pl. 7, f. 20, 46;* Massee, Ann. Bot. **4:** *pl. 4, f. 80* [Monogr. Brit. Gast. *pl. 4, f. 80*].

Type: in Berkeley Herb. at Kew.

Fructifications 2 cm. in diameter when dry, spherical to somewhat irregular, white, rufous when bruised, drying wood-brown; mycelium white, fibrillose; columella thin, dendroid; fibrils small, nearly free, lighter-colored on the under side of the fructification; peridium 160–180 μ thick, composed of branched, hyaline, gelatinized hyphae 3.5 μ in diameter, underlaid with a sterile portion of the gleba which is composed of thin-walled, parallel hyphae forming a gel as in the septa; gleba Saccardo's olive; cavities long and narrow, filled with spores; septa of thin-walled, parallel

hyphae forming a gel, 90–100 μ thick, basidia not seen; spores rhomboidal, yellowish brown, 17–21 × 6–8 μ.

England.

Specimens examined:

England: near Bristol, *C. E. Broome*, Nov. 1848 (Curtis Herb. at Farlow Herb.); [Leigh Wood, *C. E. Broome*, Aug.] type (in Patouillard Herb. ex Herb. Tulasne at Farlow Herb.).

9. Hysterangium Rickeni Soehner, Pilz- und Kräuterfreund **4:** 190–192. 1921; Kryptog. Forsch. **1:** 393. 1924.

Type: in Soehner Herb. but not seen. Authentic material from Soehner in Dodge Herb. and Zeller Herb.

Fructifications spherical, up to 1 cm. in diameter, white to slightly yellowish with a dull reddish tone, finally dirty gray with a violet-brown undertone, drying 0.6 cm., furrowed to scrobiculate, avellaneous; peridium thin, 175–220 μ thick, coriaceous, not easily separable, composed of slender, compact, periclinal hyphae; columella well developed, bluish; gleba at first white with a greenish tone, olive-green when mature, becoming dark green, drying citrine drab; cavities variable in shape; basidia clavate to cylindrical, 2-spored, slender, 28–35 × 4–7 μ; paraphyses smaller but up to 10 μ broad; spores hyaline, yellow to olive-green in mass, 15–18 × 6–7 μ, occasionally less than 15 μ or up to 20 μ, 1–3-guttulate.

Under *Fagus*. Central Europe. June to August.

The above description is based on Soehner's forma *fagorum* which was first and more fully described.

Forma **pinetorum** Soehner, Pilz- und Kräuterfreund **4:** 191. 1921.

This form in pine woods is distinguished by a brighter gray-green, more fragile gleba, more yellowish columella, and non-guttulate spores.

Under *Pinus*. Bavaria. September to November.

The specimen from Salzburg, cited below, was collected in pine woods.

Specimens examined:

Austria: Salzburg, *E. Soehner*, *1045* (in Soehner Herb. and Dodge Herb.).

Germany: Bavaria, Pöpplinger Heide bei München, *E. Soehner, 1014* (in Soehner Herb. and Dodge Herb.).

10. Hysterangium fragile Vittadini, Monogr. Tuberac. 14. 1831; Tulasne, Fung. Hypog. 84. 1851; Winter in Rabenhorst, Krypt.-Fl. Deutschl. ed. 2, I. **1:** 879. 1883; DeToni in Saccardo, Syll. Fung. **7:** 156–157. 1888; Hollós, Magyarorszag Földalatti Gombai, 88–89. 1911; ? Hesse, Hypog. Deutschl. **1:** 103–104. 1891; Soehner, Krypt. Forsch. **1:** 392. 1924.

Illustrations: Vittadini, Monogr. Tuberac. *pl. 4, f. 15;* ? Hesse, Hypog. Deutschl. **1:** *pl. 7, f. 22.*

Type: location unknown to us.

"Fructifications subglobose, without fibrils ? ; peridium thick, very fragile, yellow without, bare, granulose, farinose; gleba very soft, ashy, becoming greenish; cavities irregular, scarcely visible; odor, when fresh, that of *Tuber Borchii;* about the size of a filbert; peridium soft, thick, white within, reminiscent of the cortex of the stipe of *Verpa digitaliformis*, easily separating from the gleba. A gelatinous layer attaching the peridium to the gleba is very thick, hence the mature gleba is very soft and subdeliquescent. When mature and freshly dug, the peridium cracks off as easily as the shell of a sparrow's egg.

"In oak woods near the Po River, under fallen leaves, half buried; winter. It has been found by me twice. This species has the surface color of *H. clathroides*, the softness of the flesh of *H. membranaceum;* it differs from both in the nature of the peridium, odor, habitat and season."—Vittadini.

Hesse, who reports finding this species twice on Dammelsberg near Marburg, gives the following characters: peridium 1.5 mm. thick, composed of richly septate and branched hyphae; cavities small; septa broad; basidia cylindrical, 2–3-spored; spores slightly appendiculate, 12 × 4 μ, gray-green in mass. Soehner reports several collections agreeing with Hesse's description, spores 10–12.5 × 3–4 μ. Hollós reports several collections from Hungary agreeing with Hesse, giving spores 12–16 × 4–5 μ. This material seems to belong to a distinct species but we prefer not to name it until more material is available.

Hollós, after studying a fragment of the type, states that the

spores are 22–24 × 7–8 μ, peridium red-spotted, drying very thin, and regards *H. fragile* Vitt. as a possible synonym of *H. stoloniferum* Tul. Tulasne reports the spores 23 × 6.4 μ, practically obliterating the cavities.

11. Hysterangium calcareum Hesse, Hypog. Deutschl. **1:** 97. 1891; Saccardo, Syll. Fung. **11:** 168. 1895. Pl. 3, fig. 15.

Illustrations: Hesse, Hypog. Deutschl. **1:** *pl. 7, f. 21, 23; pl. 9, f. 15.*

Type: probably in Bot. Inst. Univ. Marburg; not seen, although other material determined by Hesse was studied.

Fructifications globose, the size of a hazel-nut, grayish white; columella branched, penetrating to the middle of the fructification; peridium fleshy when young, becoming fragile and papery, 0.6 mm. thick, composed of an outer layer of grayish white, thin-walled hyphae, a layer of brownish yellow hyphae, a layer of coarse, loosely woven, septate, hyaline hyphae, and another very thin layer of slender brownish yellow, periclinal hyphae; gleba bluish to olive-green; cavities narrow, much longer than broad, at first empty, later filled with spores; septa thinner than in *H. rubricatum*, cartilaginous; basidia cylindric, 2-spored; spores broad-ellipsoidal, 11–13 × 4–5 μ, hyaline, gray-green in mass, appendiculate, epispore thin at first, thickening with age.

In calcareous soil in birch woods. Germany and Czechoslovakia. Summer.

This species differs from *H. clathroides* in structure of the peridium, form and size of the spores, and the longer cavities, and from *H. rubricatum* in lack of a reddish color in the peridium.

Specimens examined:

Czechoslovakia: Mähren, Zwittau, *J. Hruby* (in Hesse Herb. at Bot. Inst. Univ. Marburg).

12. Hysterangium Petri Mattirolo, Malpighia **14:** 262–263. 1900; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 247. 1902.

Type: location unknown to us.

Fructifications globose, white, lightly spotted with yellow, unchanging, varying in size from that of a pea to that of a filbert; columella central, gelatinous, little developed; peridium easily

separable, fibrous, composed of thick-walled hyphae; gleba grayish virescent; cavities minute-elongate; basidia 2-spored, cylindrical; spores ovate-elongate, smooth, hyaline, 11–14 × 4–5 μ; odor weak.

In chestnut groves. Italy. April.

This species is nearest *H. Thwaitesii*, from which it differs by the yellow color of the peridium, which remains unaltered in alcohol or on drying, and in the size of the spore.

DOUBTFUL SPECIES

1. Hysterangium viscidum Massee & Rodway, Kew Bull. Misc. Inf. **1898:** 127. 1898; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 246. 1902; Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 27–28. 1912; **1923:** 155. 1924.

Illustrations: Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** *pl. 3, f. 8.*

Type: not seen.

"Fructifications irregular, oblong, chestnut-color, viscid, 3 × 1.5 cm.; peridium thick, tough, easily separable from the gleba; gleba pale at first, dark brown in age; cavities radiating from the base, small, irregular; septa thick, brown, not scissile; basidia 3–4-spored; spores broadly oblong-ellipsoidal, obtuse at both ends, 12–15 × 8–10 μ, minutely papillate, yellowish brown to dirty brown in mass.

"In gullies near Hobart, *L. Rodway, 270.*

"Readily distinguished in the genus by the chocolate brown, viscid peridium and elliptic oblong, obtuse spores."—Massee & Rodway.

It seems quite probable that this species belongs in the genus *Hymenogaster*, and in the group of species of that genus with viscid peridia, for nearly all the characters given in the meagre description are very unusual in the genus *Hysterangium*. However, since we have not seen the type nor any material surely referable there, we prefer to leave this among the doubtful species.

Cleland's collection, No. 16, National Park, S. Australia, agrees with the above description in all respects. It is also referable to *Hymenogaster nanus* Massee & Rodway, 1899.

2. Hysterangium fusisporum Massee & Rodway, Kew Bull. Misc. Inf. **1898:** 127. 1898; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 247. 1902; Rodway, Roy. Soc. Tasmania Papers & Proc. **1911:** 26. 1912; **1923:** 155. 1924.

Type: probably at Kew Herb. but not seen.

Subglobose, irregular, 1.5–2 cm. in diameter, smooth, very thin, white to yellow-spotted, hyaline within; peridium not separable; gleba firm, pale; cavities small, irregular, sinuous; spores fusiform, smooth, 20–22 × 8 μ, hyaline; basidia 2-spored; sterigmata short.

Habitat, subterranean, Tasmania (*Rodway*).

While we have not seen the type, material sent us by Rodway should be referred to *Hymenogaster*. Further consideration of these species may be deferred until we have seen the type.

EXCLUDED SPECIES

1. Rhizopogon Marchii (Bresadola) Zeller and Dodge, comb. nov.

Hysterangium Marchii Bresadola, Fung. Trident. **2:** 99. 1900; Saccardo & P. Sydow in Sacc. Syll. Fung. **16:** 246. 1902; Bataille, Soc. Myc. France Bull. **39:** 166. 1923.

Illustrations: Bresadola, Fung. Trident. **2:** *pl. 211, f. ii.*

Type: portion of type in Dodge Herb.

Fructifications irregularly depressed-globose, 2–3.5 × 1–2 cm., color Natal brown when moist, drying avellaneous to wood-brown (Isabella color in Bresadola's plate); rooting fibrils few, large; columella branching almost at the base of the fructifications, slender, inconspicuous; peridium 180–230 μ thick, stupose, composed of granulose, large, thin-walled, yellow-brown hyphae 5–8 μ in diameter, loosely woven toward the outside, slightly smaller and more compactly woven within; gleba buffy citrine, cavities very small, irregular, filled with spores; septa 140–160 μ, composed of slender, thin-walled hyphae 3–5 μ in diameter, becoming highly gelatinized at maturity; spores acrogenous, old gold, ellipsoidal, often truncate at the base, 8–11 × 4–5.5 μ, smooth. No odor.

Under *Pinus nigra* near Trieste. September.

Specimens examined:

Italy: Trieste, Verla, *I. Marchi*, type (in Bresadola Herb. and in Dodge Herb.).

2. Rhizopogon niger (Lloyd) Zeller & Dodge, comb. nov.

Hysterangium niger Lloyd, Myc. Notes 68: 1173. 1923, nom. nud.; Verwoerd, S. African Jour. Sci. **22**: 163. 1925.

Illustrations: Lloyd, Myc. Notes 68: *f. 2325*.

Fructificationes depresso-sphaeroideae, subirregulares, 3 × 1 × 1.5 cm. diametro metientes, nigrae; peridium tenue, 75–100 μ crassitudine, stuppeum, hyphis nigro-brunneis, 2–3 μ diametro, subparallelibus contextum; gleba "Brussels brown" (Ridgway); locelli parvi, angulares, vacui; septa circa 40–50 μ crassitudine, gelatinosa, cellulis ellipsoideis vel sphericis, facile tinguentibus impletis, strato medio cellulis elongatis facile tinguentibus; basidia filiformia, trispora; sporae brunneae acervatae, ellipsoideae, 7–9 × 2–3 μ.

Type: in Lloyd Museum, in Dodge Herb., and in Zeller Herb.

Fructifications depressed-spheroidal to somewhat irregular, perhaps due to the coalescence of several fructifications, drying 3 × 1 × 1.5 cm., black without, covered with adhering sand grains; peridium 75–100 μ thick, stupose, composed of dark brown, thick-walled, nearly parallel hyphae 2–3 μ in diameter; gleba Brussels brown; cavities small, angular, empty; septa about 40–50 μ thick, highly gelatinized, traversed through the middle by a layer of deeply staining, closely woven hyphae, the remainder of the gelatin filled with irregularly placed, ellipsoidal to spherical, deeply-staining cells, which seem to have no visible connection either with the central strand or with each other; basidia narrow, filiform, crowding out between the superficial, gelatinized cells of the septa, mostly 3-spored; spores brown in mass, slender, ellipsoidal, 7–9 × 2–3 μ.

South Africa.

Superficially this species looks like *Rhizopogon piceus;* the color and texture of the gleba is much as in *R. pachyphloeus*, but micsoscopically it is easily distinguishable from either.

Specimens examined:

South Africa: Knysna, *Miss A. V. Duthie,* type (in Lloyd Mus. 081, in Dodge Herb. 353, and in Zeller Herb. 7246).

3. Hysterangium ? Pseudo-Acaciae (Fries) DeToni in Sacc. Syll. Fung. **7**: 159. 1888.

Mylitta Pseudacaciae Fries, Syst. Orb. Veg. **1:** 154. 1825; Syst. Myc. **3:** 226. 1829.

Mylittaea Pseudo-Acaciae Cesati in Rabenh. Klotzschii Herb. Viv. Myc. **16:** No. 1549. 1851 (with description).

This species was evidently based on the nodules of *Robinia Pseudacacia*, caused by *Rhizobium* sp., according to the collection of Cesati cited below, confirming the opinion of Mattirolo, Che cosa é la Mylitta Pseudo-Acaciae Fries ? Soc. Bot. Ital. Bull. **1924:** 13–16. 1924. If a study of Chaillet's specimen in Fries' herbarium (the type) should confirm this, *Mylitta* and its variant *Mylittaea* should be dropped as based on a mixture of parasite and host in accordance with article 51, section 4a, of the International Rules of Nomenclature. It is probable that DeToni referred this species to *Hysterangium* without having seen a specimen, since certain phrases of the original descriptions suggest this genus.

Specimens examined:

Italy: Piemonte, Vercelli, *V. Cesati* in Rabenhorst, Klotzschii Herb. Viv. Myc. **16:** 1549 (in Farlow Herb.).

ERRATA

Since correcting proof of this article, we have found that A. Trotter, in the supplement to the last section of volume 24 of Saccardo's 'Sylloge,' has translated descriptions by Rodway.

Page 84, last paragraph, line 2, insert 8 instead of 11.

Page 97, line 23, page 98, line 22, and page 115, line 25, delete "sp. nov." and add "apud Trotter in Sacc. Syll. Fung. **24:** 1327. 1928."

Explanation of Plate

PLATE 1

Fig. 1. *Hysterangium album* Zeller & Dodge.
Section of peridium and gleba showing their structure and relation to each other. From type material. × 42.5.

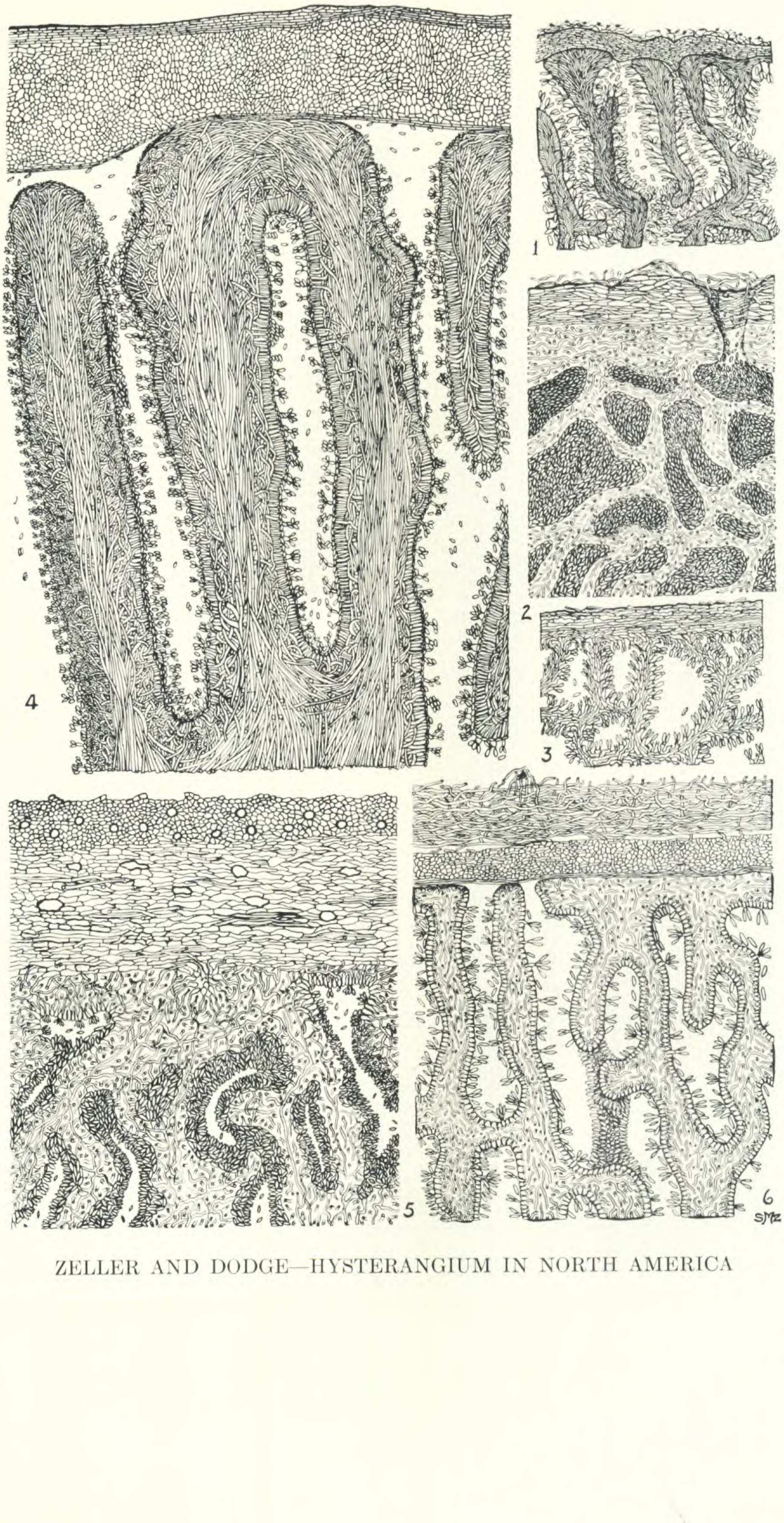
Fig. 2. *Hysterangium Fischeri* Zeller & Dodge.
Section showing structure of peridium and gleba and their relation. The peculiar pores extending from glebal cavities to the surface of the fructifications were not infrequently found in the type material, but may not be a constant character. × 42.5.

Fig. 3. *Hysterangium pumilum* Rodway.
Section showing the relation of the peridium to the gleba, the simple structure of the septa, and the pseudoparenchyma of the peridium. Drawing made from cotype material. × 42.5.

Fig. 4. *Hysterangium crassirhachis* Zeller & Dodge.
Section showing the parenchyma of the easily-separable peridium and the structure of the very broad, radiating septa. Drawing made from type material. × 42.5.

Fig. 5. *Hysterangium purpureum* Zeller & Dodge.
Section of the peridium and gleba showing their close relation to each other, the two types of parenchyma of the peridium, both of which are penetrated periclinally by lacunae. The septa are gelatinous. Drawing from type material. × 42.5.

Fig. 6. *Hysterangium strobilus* Zeller & Dodge.
Section showing the outer, fibrous layer which is more readily separable from the inner, parenchymatous layer of the peridium than is the latter from the gleba. Drawing from type material. × 42.5.



ZELLER AND DODGE—HYSTERANGIUM IN NORTH AMERICA

Explanation of Plate

PLATE 2

Fig. 1. *Hysterangium affine* Massee & Rodway.
Section showing parenchyma of the peridium and the relation of the latter to the gleba. Drawing from Rodway's Tasmanian collection No. 1261. × 42.5.

Fig. 2. *Hysterangium cistophilum* (Tulasne) Zeller & Dodge.
Section showing the fibrous structure of the peridium and the layer of glebal tissue beneath it. Drawing from Zeller's Oregon collection No. 7197. × 42.5.

Fig. 3. *Hysterangium clathroides* Vittadini.
Section of peridium and gleba showing the separable character of the peridium along the inner side of a thin fibrous layer beneath the major parenchymatous portion. Drawing from Zeller's Oregon collection No. 2582. × 42.5.

Fig. 4. *Hysterangium inflatum* Rodway.
Section showing the rather thin parenchymatous peridium, the very thin film of pseudoparenchyma between it and the gleba, and the thick, underlying, sterile, glebal layer. The peridium separates from the gleba along the line of pseudoparenchyma. Drawing from Rodway's Tasmanian collection No. 1267, which is labeled "cotype." × 42.5.

Fig. 5. *Hysterangium Thaxteri* Zeller & Dodge.
Section of the peridium and gleba showing the very thick gelatinous layer of peridium and the thinner fibrous outer layer (rind). The hyphae of the gelatinous layer are suspended in a hyaline gel. Note the peculiar clamp-connections of the inner peridial layer and tramal tissues of the septa. Drawing from Dr. Thaxter's Argentine type collection. × 42.5.

ZELLER AND DODGE—HYSTERANGIUM IN NORTH AMERICA

EXPLANATION OF PLATE

PLATE 3

Fig. 1. *Hysterangium occidentale* Harkness.

Section of the peridium and gleba showing their relation and structure. The outer peridial layer of loosely interwoven hyphae overlies a layer which is a peculiar mixture of parenchyma and pseudoparenchyma. A thin fibrous layer separates peridium and gleba. The septa and main percurrent branches of the columella are thick and of a gelatinous structure. Drawing from Oregon material (Zeller, 7063). × 42.5.

Fig. 2. *Hysterangium neglectum* Massee & Rodway.

Section showing structure of the peridium and gleba, and section of one percurrent branch of the columella. The peridium is composed of two distinct layers of pseudoparenchyma. Drawing from Tasmanian material (Rodway, 614, cotype). × 42.5.

Fig. 3. *Hysterangium obtusum* Rodway.

Section of the thick peridium of spongy pseudoparenchyma which is mixed with some parenchyma but as a whole not in definite layers. The outer rind is almost distinct because of color and heavy cell walls. The septa of the gleba are fibrous in structure. Drawing from Tasmanian material (Rodway, 1264, cotype). × 42.5.

Fig. 4. *Hysterangium fuscum* Harkness.

Section showing the fibrous structure of the peridium and its relation to the underlying layer of sterile glebal tissue. Drawing from Parks' Californian collection, No. 1167. × 42.5.

Figs. 5–29. Outline drawings to show relative size and form of various species of *Hysterangium*. All, × 500.

Fig. 5. Spores of *H. album* Zeller & Dodge.
Fig. 6. Spores of *H. affine* Massee & Rodway.
Fig. 7. Spores of *H. neglectum* Massee & Rodway.
Fig. 8. Spores of *H. Fischeri* Zeller & Dodge.
Fig. 9. Spores of *H. occidentale* Harkness.
Fig. 10. Spores of *H. obtusum* Rodway.
Fig. 11. Spores of *H. strobilus* Zeller & Dodge.
Fig. 12. Spores of *H. clathroides* Vittadini.
Fig. 13. Spores of *H. stoloniferum* Tulasne.
Fig. 14. Spores of *H. fuscum* Harkness.
Fig. 15. Spores of *H. calcareum* Hesse.
Fig. 16. Spores of *H. nephriticum* Berkeley.
Fig. 17. Spores of *H. membranaceum* Vittadini.
Fig. 18. Spores of *H. Thwaitesii* Berkeley & Broome.
Fig. 19. Spores of *H. inflatum* Rodway.
Fig. 20. Spores of *H. crassirhachis* Zeller & Dodge.
Fig. 21. Spores of *H. purpureum* Zeller & Dodge.
Fig. 22. Spores of *H. cistophilum* (Tulasne) Zeller & Dodge.
Fig. 23. Spores of *H. Pompholyx* Tulasne.
Fig. 24. Spores of *H. Harknessii* Zeller & Dodge.
Fig. 25. Spores of *H. pumilum* Rodway.
Fig. 26. Spores of *H. Phillipsii* Harkness.
Fig. 27. Spores of *H. rubricatum* Hesse.
Fig. 28. Spores of *H. Thaxteri* Zeller & Dodge.
Fig. 29. Spores of *H. neocaledonicum* Patouillard.